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PLAN and
ENVIRONMENTAL IMPACT STATEMENT
for

WATERSHED PROTECTION
FLOOD PREVENTION
RECREATION
and
RECREATIONAL, AGRICULTURAL, AND
MUNICIPAL & INDUSTRIAL WATER SUPPLY

MIDDLE CREEK WATERSHED

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ADDENDUM

Middle Creek Watershed
Linn and Miami Counties, Kansas

This addendum shows annual project costs, benefits, and the benefit-cost ratio based on 6 5/8 percent interest, 1977 installation costs, current normalized prices for agricultural commodities, and 1977 current prices for other items.

1. Project costs are $333,400

2. Project benefits are $515,200

3. The project benefit-cost ratio is 1.5:1.

January 1978

WATERSHED PLAN AND

ENVIRONMENTAL IMPACT STATEMENT

MIDDLE CREEK WATERSHED

Linn and Miami Counties, Kansas

Prepared under the Authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

Prepared by: Linn County Conservation District
Miami County Conservation District
Middle Creek Watershed Joint District No. 50
City of Louisburg, Kansas
Miami County Rural Water District No. 2
Kansas Forestry, Fish and Game Commission
Kansas State Conservation Commission
Office of Kansas State and Extension Forestry
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of Agriculture, Forest Service

October 1977

PREFACE

Enclosed are two documents--the Watershed Plan and Environmental Impact Statement for Middle Creek Watershed, Kansas.

The Watershed Plan has been developed by the local sponsors with the assistance of the U.S. Department of Agriculture and is the basis for the authorization of federal assistance to implement the proposed project in accordance with the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008).

The Environmental Impact Statement has been prepared by the U.S. Department of Agriculture in compliance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The Environmental Impact Statement contains the detailed information on project area, planned project, problems, impacts, alternatives, etc.

TABLE OF CONTENTS

WATERSHED PLAN

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TABLE OF CONTENTS

ENVIRONMENTAL IMPACT STATEMENT

WATERSHED PLAN

MIDDLE CREEK WATERSHED

Linn and Miami Counties, Kansas

Middle Creek Watershed Plan
Linn and Miami Counties, Kansas

SUMMARY AND DESCRIPTION

Middle Creek Watershed covers 69.8 square miles of eastern Kansas in Linn and Miami Counties about 30 miles south of Kansas City. Middle Creek is a left bank tributary to the Marais des Cygnes River.

This plan is sponsored by Middle Creek Watershed Joint District No. 50, Linn and Miami County Conservation Districts, City of Louisburg, Miami County Rural Water District No. 2, and Kansas Forestry, Fish and Game Commission. The conservation districts have been actively applying land treatment in the watershed. Summary of their accomplishments is shown in Table 1A.

A major problem in the watershed is flood damage along Middle Creek. Average annual flood damage in the watershed is estimated at $472,000 of which 58 percent is crop and pasture damage. Sediment and debris (log jams) in the lower reaches of Middle Creek decrease channel capacity. Other problems are erosion, sedimentation, shortages of water-based public recreation areas, and lack of water for municipal, industrial, and agricultural use.

This project will include conservation land treatment, log jam removal, and structural measures. Structures include floodwater retarding dams and 1 multipurpose dam for floodwater retardation, public recreation, and municipal, industrial, and agricultural water supply.

Average annual flood damage will be reduced 63 percent. Soil loss in the watershed and sediment yield to the Marais des Cygnes River will be reduced. Water quality will be improved by reducing sediment. Decreased sediment concentration and pools created by dams will benefit aquatic wildlife in the watershed. Pond fishery potential will improve. The multipurpose site will increase public recreational opportunities and store water for recreational, municipal, industrial, and agricultural use.

Seven years will be required for project installation. Installation will cost $4,663,200 of which $3,190,400 will be P.L. 566 funds.

Land treatment measures will be installed and maintained by landowners and operators through voluntary agreements

with conservation districts. Structures will be installed and log jams removed by project sponsors. Middle Creek Watershed Joint District No. 50 will operate and maintain all floodwater retarding structures; and the dam and spillway of the multipurpose structure. Miami County Rural Water District No. 2 will operate and maintain the water supply works. The Kansas Forestry, Fish and Game Commission will operate and maintain the recreational facilities. Estimated average annual cost for operation and maintenance of structural measures is $30,300.

Annual benefits are expected to average $500,300 while average annual costs for the structural measures are estimated at $296,500.

PLANNED PROJECT

Planned project measures include accelerated conservation land treatment on 1,700 acres of cropland, 1,910 acres of grassland, and 536 acres of forest land. This is in addition to 3,200 acres of cropland, 3,620 acres of grassland, and 289 acres of forest land to be treated under the going program. Land treatment includes conservation practices listed in Appendix F of the Environmental Impact Statement. Four detention dams are planned as land treatment measures. Farmers cooperating with conservation districts will develop plans for orderly application of effective conservation practices.

Planned structural measures include 7 floodwater retarding dams and 1 multipurpose floodwater retarding, water supply, and recreational structure with recreational facilities. They will provide 6,824 acre feet of floodwater storage from 29.80 square miles, 42.7 percent of the watershed district. Drainage areas of individual dams range from 1.76 to 7.41 square miles. Dam heights vary from 27 to 56 feet.

Log jams will be removed from the main channel of Middle Creek to increase its capacity.

For details of the planned project see Tables 1, 2B, and 3 of the Plan; and the Planned Project section, Project Map, and Recreation Development Map (Appendix H) of the Environmental Impact Statement.

INSTALLATION COSTS - MONETARY

Planned project land treatment measures and their estimated costs are shown in Table 1. Estimated total

planning and installation costs for accelerated land treatment are $497,700 based on current prices.

Structural measures and their estimated costs are also shown in Table 1. These costs are shown for individual structures in Table 2. Total estimated cost for structural measures is $4,165,500.

Construction costs include direct costs of installation for 7 floodwater retarding structures, $1,213,200; 1 multipurpose structure, $576,600; recreational facilities, $234,600; water supply intake structure, $29,000; and log jam removal, $20,900. Major items are earth embankment, excavation, and reinforced concrete. Typical costs also include wildlife habitat measures, seeding, and fencing. Total construction costs are estimated at $2,074,300.

Engineering services costs include all direct and related costs of surveys, geologic site investigations, soil mechanics, structure designs, construction plans, and construction specifications. Engineering services costs are estimated at $308,300 (see the Agreement for details).

Relocation payments totaling $23,200 will be made to landowners and operators displaced by the project. Relocation costs include all payments and services provided according to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Land rights costs are direct and related costs for the right to install, operate, and maintain works of improvement. These costs include land purchases, easements, agreements, permits, and modifications or relocations of properties and utilities. Land values were estimated by Middle Creek Watershed Joint District No. 50 with Soil Conservation Service concurrence. Land rights cost estimates are based on current land values. Estimates vary from $400 to $950 per acre. Land rights cost estimates may exceed actual expenses because some land rights may be donated. Land rights costs for 7 floodwater retarding structures and log jam removal are $336,700. Land rights costs for the multipurpose structure and associated improvements are $603,500; details are shown in the Planned Project section of the Environmental Impact Statement.

Project administration costs ($819,500) include contract administration, review of engineering plans prepared by others, construction inspection, and relocation assistance advisory services.

Construction and engineering costs for the multipurpose structure, excluding recreational facilities, are allocated using the use of facilities method. They are: flood prevention, 45.4 percent; public recreation, 39.4 percent; municipal and industrial water supply, 9.3 percent, and agricultural water supply, 5.9 percent (see Table 2A).

Cost sharing between P.L. 566 and other sources is shown in the Agreement.

ECONOMIC BENEFITS

Average annual project benefits are estimated at $500,300. Individual items are shown in Tables 5 and 6.

Average annual floodwater damage reduction benefits will total $224,200. Benefits from reduced floodwater damage to crops and pastures will average $177,200 annually and account for 79 percent of the total floodwater damage reduction benefits. Reduced flooding will achieve benefits of $24,800 to other agricultural properties such as stored feed, fences, buildings, and other farm facilities. Annual average benefits of $22,200 to roads and bridges will result.

Benefits from reduced flood plain scour and sediment deposition will average $45,300 annually, accounting for about 15 percent of the total damage reduction benefits. Indirect benefits, such as less interruption of travel on mail, school, and milk routes, will average $28,000 annually.

The reduced flood hazard will make possible annual benefits averaging $33,200 from more intensive use of land through improved crop rotations and use of fertilizer.

Multipurpose Structure No. 1 and associated recreational facilities will produce annual recreational benefits of $112,500 from boating, fishing, sightseeing, camping, hunting, and picnicking. This structure will also yield $57,100 annual benefit from water for agricultural, municipal, and industrial use.

Average annual cost of structural measures including installation, operation, maintenance, and administration is $296,500 (see Table 4). The completed project is expected to produce average annual benefits of $500,300 (excluding local secondary benefit). This benefit-cost ratio is 1.7:1.

INSTALLATION AND FINANCING

Works of improvement will be installed in a 7-year period following authorization of federal assistance under the Watershed Protection and Flood Prevention Act.

The following tables show anticipated cost, by fiscal year, for both land treatment and structural measures:

Land Treatment

Fiscal Year	P.L. 566 Costs	Other Costs	Total
First	$ 10,400	$ 79,000	$ 89,400
Second	10,400	79,000	89,400
Third	10,400	79,000	89,400
Fourth	10,400	79,000	89,400
Fifth	10,400	79,000	89,400
Sixth	5,200	39,500	44,700
Seventh	700	5,300	6,000
Total	$ 57,900	$439,800	$ 497,700

Structural Measures

Fiscal Year	P.L. 566 Costs	Other Costs	Total
First	$ 466,500	$406,200	$ 872,700
Second	549,500	378,500	928,000
Third	487,900	78,800	566,700
Fourth	566,300	109,900	676,200
Fifth	462,300	31,700	494,000
Sixth	294,600	23,200	317,800
Seventh	305,400	4,700	310,100
Total	$3,132,500	$1,033,000	$4,165,500

Land treatment measures that are part of the planned project (see Table 1) will be installed by individual landowners or operators. Cost sharing through local, state, and/or federal programs will be used as it becomes available. The Soil Conservation Service and the Kansas State and Extension Forester in cooperation with the U. S. Forest Service will provide technical assistance. The Extension Service will assist the conservation districts in preparing general information for the educational phase of the land treatment program. The Farmers Home Administration soil and water loan program will be available. County

Agricultural Stabilization and Conservation Committees will cooperate with conservation districts to accelerate assistance for conservation practices.

Land treatment detention dams will be installed through contracts made by landowners or operators. The Soil Conservation Service will provide technical assistance including engineering. Landowners or operators and the watershed district will provide construction funds. Other programs to defray installation costs will be used as they become available.

Land rights for all land treatment measures will be provided by individual landowners or operators. Administration will be shared by landowners, the watershed district, conservation districts, and the Soil Conservation Service. Additionally, any agency offering an assistance program for land treatment will administer its own program.

Middle Creek Watershed District will contract for log jam removal, construction of the single purpose floodwater retarding structures, fencing, and establishing vegetation; including wildlife habitat measures. The watershed district will appoint a contracting officer to represent it in all contractual matters. Construction funds and engineering services will be provided by the Soil Conservation Service. Land rights will be provided by the watershed district. Administration will be accomplished by the Soil Conservation Service and the watershed district.

The watershed district will contract for construction of the multipurpose structure. Land rights acquisition will be financed by the City of Louisburg and Miami County Rural Water District No. 2; and performed by the watershed district. Relocation assistance will be offered by the watershed district. Construction cost will be shared between the Soil Conservation Service, the City of Louisburg, and Miami County Rural Water District No. 2 for all water and sediment storage. Construction cost of the recreational facilities will be shared between the Soil Conservation Service and the Kansas Forestry, Fish and Game Commission. Engineering costs for the structure and associated recreational facilities will be shared between the Soil Conservation Service and the Kansas Forestry, Fish and Game Commission, the City of Louisburg, and Miami County Rural Water District No. 2. Each agency will administer that part of the project for which it is responsible. The Kansas Forestry, Fish and Game Commission will either contract for construction of recreational facilities or install them under performance of work agreements.

The sponsors have the necessary authority to finance and install watershed improvements. This includes the right to accept contributions, levy taxes, make assessments against land specially benefited, issue bonds, and exercise the right of eminent domain. The district has agreed to use these powers as needed.

The watershed district and Miami County Conservation District assure installation of at least 75 percent of the effective land treatment on critical sediment source areas in the drainage area of any floodwater retarding structure which, if uncontrolled, would require a material increase in the cost of construction, operation, maintenance, or replacement of that structure.

Expenses of organizing the watershed district have been paid and current expenses are being met by an annual ad valorem tax. Future expenses of the sponsors will be met with funds on hand and budgeted for the purpose, funds collected through taxes, and through issuance of general obligation bonds.

The City of Louisburg and Miami County Rural Water District No. 2 have each requested a watershed loan and advance to cover the local share of installation costs of the multipurpose structure.

P.L. 566 funds for construction and land rights will be provided to the local sponsoring organizations through project agreements executed with the Soil Conservation Service.

Prior to making agreements that obligate funds of the Soil Conservation Service, the sponsors will have financial management systems for control, accountability, and disclosure of P.L. 566 funds received, and for control and accountability for property and other assets purchased with P.L. 566 funds.

Federal technical assistance, engineering services, project administration, and funds for construction are contingent upon appropriations for these purposes.

Construction will be started when necessary land treatment has been completed, land rights have been obtained, P.L. 566 funds are available, and sponsoring organizations have obtained approval of construction plans and have necessary construction permits.

OPERATION, MAINTENANCE, AND REPLACEMENT

Landowners and operators will maintain land treatment measures including detention dams on their farms under voluntary agreements with their conservation districts. Conservation district representatives will make periodic inspections of land treatment measures to encourage landowners to perform needed maintenance.

Technical assistance to landowners and rural fire districts for operating and maintaining forestry and fire control measures will be provided by the Kansas State and Extension Forester in cooperation with the Forest Service.

Agreements for operation and maintenance of structures, associated wildlife habitat and other vegetative measures, and recreational facilities will be made between sponsors and the Soil Conservation Service before construction begins. These agreements will conform to the Kansas Watersheds Operation and Maintenance Handbook and will include provisions for retention and disposal of property acquired or improved with P.L. 566 cost sharing.

Municipal, industrial, and agricultural water in Multipurpose Structure No. 1 will be stored between elevations 985.4 and 982.3. Water storage for public recreation will be between elevations 982.3 and 969.2. Top of the sediment pool will be at elevation 969.2. The reservoir will stay full about 80 percent of the time and will contain 3,000 acre feet of water (281 surface acres). It will contain 632 acre feet (95 surface acres) or more 98 percent of the time assuming 0.97 million gallons per day (mgd) are being withdrawn. Miami County Rural Water District No. 2 will operate and maintain the water supply works and will notify the Soil Conservation Service when the water surface drops below elevation 982.3.

Floodwater retarding dams and associated vegetative measures will be operated and maintained by the watershed district at an estimated annual cost of $6,100. The multipurpose structure (excluding water supply works, recreational facilities, and areas reserved for wildlife management) will be operated and maintained by the watershed district. The watershed district will be responsible for maintaining drawdown control valves and passing natural streamflow through all the floodwater retarding structures to meet downstream water rights as provided by the Kansas Water Appropriation Act.

Estimated annual cost of operation and maintenance for the multipurpose structure is $3,000. Recreational facilities and fish and wildlife habitat measures for the multipurpose development will be operated, maintained, and replaced by the Kansas Forestry, Fish and Game Commission at an estimated annual cost of $21,100 of which $6,100 is for replacement.

After log jam removal the channel will be kept free from similar obstructions by the watershed district at an estimated cost of $100 per year.

Kinds of maintenance expected frequently are repairs to fences, clearing of debris, repair or replacement of recreational facilities, etc. Repairs to major items such as dams and spillways are expected infrequently. Technical assistance will be provided by the Soil Conservation Service.

Structural measures will be inspected annually, after unusually heavy rainfall, and after any other unusual condition that might adversely affect their operation, maintenance, or safety. The Soil Conservation Service and sponsors reponsible for operation and maintenance will make joint annual inspections for a 3-year period following completion of construction. Thereafter, annual inspections will be made for the life of the structures by the sponsors. Records of inspection will be kept by the watershed district. Provisions will be made for access to inspect the structures at any time.

Items inspected will include, but not be limited to: the principal spillway and its appurtenances, emergency spillway, earth fill, vegetative cover of the earth fill and emergency spillway, fences installed as part of the structural measures, wildlife habitat measures, and recreational facilities.

The 7 single purpose sites have no likelihood of public recreational use. Access to them will be controlled by landowners. The watershed district will notify landowners of the need for sanitary facilities if significant recreational use occurs; they will also notify the Kansas Department of Health and Environment. Water quality monitoring may be required.

Recreational facilities at the multipurpose site will be operated and maintained to accommodate such activities as picnicking, camping, hunting, fishing, and boating. Swimming and water skiing will not be allowed. Water quality, sanitation, and other health-related conditions will be maintained

by the Kansas Forestry, Fish and Game Commission to meet or exceed requirements of state and local public health agencies. Vectors will be controlled when necessary through methods recommended by the Kansas Department of Health and Environment.

AGREEMENT

between the following local organizations:

Middle Creek Watershed Joint District No. 50
Linn County Conservation District
Miami County Conservation District
City of Louisburg
Miami County Rural Water District No. 2
Kansas Forestry, Fish and Game Commission

(Referred to herein as sponsors)

State of Kansas

and the

Soil Conservation Service
United States Department of Agriculture

(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by the local organizations for assistance in preparing a plan for works of improvement for the Middle Creek Watershed, State of Kansas, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Soil Conservation Service (SCS); and

Whereas, there has been developed through the cooperative efforts of the local organizations and the SCS this plan for works of improvement for the Middle Creek Watershed, State of Kansas:

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through SCS and the sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The Sponsors will acquire such land rights as will be needed in connection with the works of improvement. The percentages of this cost to be borne by the Sponsors and the SCS are as follows:

Works of Improvement	Sponsors (Percent)	SCS (Percent)	Estimated Land Rights Costs (Dollars)
Multipurpose Structure No. 1 and Recreational Facilities			
Payment to landowners for about 625 acres	53.0	47.0	593,800
Legal fees, survey costs, flowage easements, and other	100.0	0	9,700
7 Floodwater Retarding Structures	100.0	0	336,600
Log Jam Removal	100.0	0	100

The Sponsors agree that all land acquired or improved with P.L. 566 financial or credit assistance will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the Operation and Maintenance Agreement.

2. The Sponsors assure that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsors and SCS as follows:

	Sponsors (Percent)	SCS (Percent)	Estimated Relocation Payment Costs (Dollars)
Relocation Payments	31.6	68.4	23,200

3. The Sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of the works of improvement.

4. The percentages of construction costs to be paid by the Sponsors and by SCS are as follows:

Works of Improvement	Sponsors (Percent)	SCS (Percent)	Estimated Construction Costs (Dollars)
7 Floodwater Retarding Structures	0	100.0	1,213,200
Log Jam Removal	0	100.0	20,900
Multipurpose Structure No. 1	31.9	68.1	576,600
Recreational Facilities	50.0a/	50.0	234,600
Water Supply Intake	80.5	19.5	29,000

a/ The sponsors will provide a part of their share by performance of work. Quantity and value will be determined mutually prior to signing, and set forth in the project agreement(s).

5. The percentages of the engineering costs to be borne by the Sponsors and SCS are as follows:

Works of Improvement	Sponsors (Percent)	SCS (Percent)	Estimated Engineering Costs (Dollars)
7 Floodwater Retarding Structures	0	100.0	184,500
Log Jam Removal	0	100.0	3,300
Multipurpose Structure No. 1	9.3	90.7	92,300
Recreational Facilities			
Layout Design	100.0	0	11,800
Onsite Planning and Standard Designs	50.0	50.0	11,800
Water Supply Intake	61.0	39.0	4,600

6. The Sponsors and SCS will each bear the costs of Project Administration which it incurs, estimated to be $10,500 and $809,000 respectively.

7. The Sponsors will obtain agreements from owners of not less than 50 percent of the land above each reservoir and floodwater retarding structure that they will carry out conservation farm or ranch plans on their land.

8. The Sponsors will provide assistance to landowners and operators to assure the installation of the land treatment measures shown in the watershed plan.

9. The Sponsors will encourage landowners and operators to operate and maintain the land treatment measures for the protection and improvement of the watershed.

10. The Sponsors will be responsible for the operation, maintenance, and replacement of the works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for constuction work.

11. The costs shown in this plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.

12. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

13. A separate agreement will be entered into between SCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

14. This plan may be amended, revised, or terminated only by mutual agreement of the parties hereto except that SCS may terminate financial and other assistance in whole, or in part, at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the Sponsors in writing of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsors or recoveries by SCS under projects terminated shall be in accord with the legal rights and liabilities of the parties. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between SCS and the Sponsors having specific responsibilities for the measure involved.

15. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

16. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and regulations of the Secretary of Agriculture (7 CFR 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.

Middle Creek Watershed Joint District No. 50

By Chas. E. Good
Chas. E. Good

10 East Peoria
Paola, Kansas 66071
Address Zip Code

Title President

Date September 26, 1977

The signing of this plan was authorized by a resolution of the governing body of the Middle Creek Watershed Joint District No. 50

adopted at a meeting held on September 26, 1977

Rob W. Steen
Secretary

Paola, Kansas 66071
Address Zip Code

Date September 26, 1977

Linn County Conservation District

By Howard R. Walker
Howard R. Walker

Title Chairman

Mound City, Kansas 66056
Address Zip Code

Date October 3, 1977

The signing of this plan was authorized by a resolution of the governing body of the Linn County Conservation District

adopted at a meeting held on October 3, 1977

Patricia A. Wallace
Patricia A. Wallace
Secretary

Mound City, Kansas 66056
Address Zip Code

Date October 3, 1977

Miami County Conservation District

By Chas. E. Good
Chas. E. Good

10 East Peoria
Paola, Kansas 66071
Address Zip Code

Title Chairman

Date September 20, 1977

The signing of this plan was authorized by a resolution of the governing body of the Miami County Conservation District

adopted at a meeting held on September 20, 1977

Hazel I. Henry
Hazel I. Henry
District Secretary

Paola, Kansas 66071
Address Zip Code

Date October 7, 1977

Kansas Forestry, Fish and Game Commission

By Jerry M. Conley
Jerry M. Conley

Route 2, Box 54A
Pratt, Kansas 67124
Address Zip Code

Title Director

Date October 14, 1977

The signing of this plan was authorized by a resolution of the governing body of the Kansas Forestry, Fish and Game Commission

adopted at a meeting held on October 14, 1977

Richard B. Langenwalter
Richard B. Langenwalter, Secretary

3 Prairie Dunes Dr.
Hutchinson, Kansas 67501
Address Zip Code

Date October 14, 1977

City of Louisburg, Kansas

By x Donald L. Glenn

City Hall
Louisburg, Kansas 66053
Address Zip Code

Title Mayor

Date October 6, 1977

The signing of this plan was authorized by a resolution of the governing body of the City of Louisburg, Kansas

adopted at a meeting held on October 5, 1977

Mary Jane Purvis
City Clerk

Louisburg, Kansas 66053
Address Zip Code

Date October 5, 1977

Miami County Rural
Water District No. 2

By Everett Oyster

121 W. Peoria
Paola, Kansas 66071
Address Zip Code

Title Chairman

Date October 7, 1977

The signing of this plan was authorized by a resolution of the governing body of the Miami County Rural Water District No. 2

adopted at a meeting held on October 13, 1977

Paul A. Mueller
Secretary

Paola, Kansas 66071
Address Zip Code

Date October 7, 1977

Appropriate and careful consideration has been given to the environmental impact statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service
United States Department of Agriculture

Approved by:

Robert K. Griffin
State Conservationist

JAN 5 1978
Date

TABLE 1 - ESTIMATED PROJECT INSTALLATION COST

Middle Crook Watershed, Kansas

Installation Cost Item	Unit	Number Non-Fed. Land	Estimated Cost Dollars[a/] P.L. 566 Funds Non-Federal Land SCS[e/]	FS[e/]	Total	Other Non-Federal Land SCS[e/]	FS[e/]	Total	Total
LAND TREATMENT-GOING PROGRAM									
Land Areas[b/]									
Cropland	Acres	3,200				156,700		156,700	156,700
Grassland	to be	3,620				606,800		606,800	606,800
Forest Land	Pro-	289					14,000	14,000	14,000
	tected								
Individual Practices such as:									
Fire Control		7,257					1,500	1,500	1,500
Technical Assistance				6,100	6,100	87,900	4,200	92,100	98,200
SUBTOTAL				6,100	6,100	851,400	19,700	871,100	877,200
LAND TREATMENT-ACCELERATED									
Land Areas[b/]									
Cropland	Acres	1,700				83,100		83,100	83,100
Grassland	to be	1,910				320,000		320,000	320,000
Forest Land	Pro-	536					26,100	26,100	26,100
	tected								
Individual Practices such as:									
Fire Control		13,478					2,700	2,700	2,700
Technical Assistance			46,400	11,500	57,900		7,900	7,900	65,800
SUBTOTAL			46,400	11,500	57,900	403,100	36,700	439,800	497,700
TOTAL LAND TREATMENT			46,400	17,600	64,000	1,254,500	56,400[c/]	1,310,900	1,374,900
STRUCTURAL MEASURES									
Construction									
Floodwater Retarding Structures	No.	7	1,213,200		1,213,200				1,213,200
Multipurpose Structure	No.	1	392,500		392,500	184,100		184,100	576,600
Recreational Facilities			117,300		117,300	117,300		117,300	234,600
Water Supply Intake Structure			5,700		5,700	23,300		23,300	29,000
Log Jam Removal	No.	9	20,900		20,900				20,900
SUBTOTAL - Construction			1,749,600		1,749,600	324,700		324,700	2,074,300
Engineering Services			279,200		279,200	29,100		29,100	308,300
Relocation Payments			15,900		15,900	7,300		7,300	23,200
Land Rights			278,800		278,800	661,400		661,400	940,200
SUBTOTAL STRUCTURAL MEASURES			2,323,500		2,323,500	1,022,500		1,022,500	3,346,000
Project Administration									
Construction Inspection			579,400		579,400				579,400
Other			229,600		229,600	10,000		10,000	239,600
Relocation Assistance Advisory Services						500		500	500
SUBTOTAL - Administration Structural Measures			809,000		809,000	10,500		10,500	819,500
TOTAL STRUCTURAL MEASURES			3,132,500		3,132,500	1,033,000		1,033,000	4,165,500
TOTAL PROJECT COSTS[d/]			3,178,900	11,500	3,190,400	1,436,100	36,700	1,472,800	4,663,200
TOTAL ALL COSTS			3,178,900	17,600	3,196,500	2,287,500	56,400	2,343,900	5,540,400

a/ Price Base 1976
b/ Includes only areas estimated to be adequately protected during the installation period. Treatment will be applied throughout the watershed, and dollar amounts apply to total land areas, not just to adequately protected areas
c/ Includes $8,100 contributed through going programs
d/ Excludes land treatment-going program
e/ Federal agency responsible for assisting in installation of works of improvement

August 1977

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT

Middle Creek Watershed, Kansas

Measures	Unit	Applied to Date	Total Cost (Dollars) [a/]
LAND TREATMENT			
Soil Conservation Service			
Conservation cropping system	Ac.	8,401	65,900
Crop residue management	Ac.	12,871	28,800
Contour farming	Ac.	6,576	11,100
Proper grazing use	Ac.	1,188	3,400
Range seeding	Ac.	6,301	42,300
Grassed waterway	Ac.	225	62,900
Diversion	Mi.	12.5	11,100
Terrace	Mi.	322.6	228,900
Farm Pond	No.	357	1,439,400
Grade stabilization structure	No.	6	20,200
Subtotal SCS			1,914,000
Forest Service			
Grazing protection	Ac.	450	4,000
Tree and shrub planting (on woodland and other land)	Ac.	25	4,000
Fire control	Ac.	10,300 [b/]	24,400
Subtotal FS			32,400
TOTAL			1,946,400

a/ Price base 1976
b/ These acres are included in Table 1 as needing further treatment.

August 1977

TABLE 2 - ESTIMATED STRUCTURAL COST DISTRIBUTION

Middle Creek Watershed, Kansas

(Dollars)[a/]

Item	Installation Cost P.L. 566 Funds					Installation Cost - Other Funds					Total Installation Cost
	Construction	Engineering	Land Rights	Relocation Payments	Total P.L. 566	Construction	Engineering	Land Rights	Relocation Payments	Total Other	
Floodwater Retarding Structures											
No. 2	187,300	28,100			215,400			74,600[b/]		74,600	290,000
No. 3	153,200	23,100			176,300			54,700		54,700	231,000
No. 4	115,500	17,400			132,900			31,200		31,200	164,100
No. 5	277,300	42,800			320,100			70,100[c/]		70,100	390,200
No. 6	168,900	26,300			195,200			40,600[d/]		40,600	235,800
No. 7	218,200	33,200			251,400			31,500		31,500	282,900
No. 8	92,800	13,600			106,400			33,900		33,900	140,300
Subtotal - FRS	1,213,200	184,500			1,397,700			336,600		336,600	1,734,300
Log Jam Removal	20,900	3,300			24,200			100		100	24,300
Multipurpose Structure No. 1	392,500	83,700	215,600	15,900	707,700	184,100	8,600	260,200[e/]	7,300	460,200	1,167,900
Recreational Facilities	117,300	5,900	63,200		186,400	117,300	17,700	64,500[f/]		199,500	385,900
Water Supply Intake	5,700	1,800			7,500	23,300	2,800			26,100	33,600
Subtotal - MPS	515,500	91,400	278,800	15,900	901,600	324,700	29,100	324,700	7,300	685,800	1,587,400
Project Administration					809,000					10,500	819,500
GRAND TOTAL	1,749,600	279,200	278,800	15,900	3,132,500	324,700	29,100	661,400	7,300	1,033,000	4,165,500

a/ Price Base 1976
b/ Includes $19,300 to raise road and modify 2 bridges
c/ Includes $3,000 to raise road and modify 1 bridge
d/ Includes $2,800 to raise road, modify 1 bridge, and dike around farmstead
e/ Includes $4,900 for legal fees, $500 for easements, and $3,000 for road and bridge modification
f/ Includes $1,300 for legal fees

August 1977

TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY

Middle Creek Watershed, Kansas

(Dollars)[a/]

Item	COST ALLOCATION					COST SHARING									
	PURPOSE					P. L. 566					OTHER				
	Flood Prevention	Recreation	Agric. Water Supply	M & I Water Supply	Total	Flood Prevention	Recreation	Agric. Water Supply	M & I Water Supply	Total	Flood Prevention	Recreation	Agric. Water Supply	M & I Water Supply	Total
7 Floodwater Retarding Structures	1,734,300	- - -	- - -	- - -	1,734,300	1,397,700	- - -	- - -	- - -	1,397,700	336,600	- - -	- - -	- - -	336,600
Multipurpose Structure No. 1	317,700	708,600	56,200	85,400	1,167,900	311,000	371,800	23,400	1,500[b/]	707,700	6,700	336,800	32,800	83,900	460,200
Recreational Facilities	- - -	385,900	- - -	- - -	385,900	- - -	186,400	- - -	- - -	186,400	- - -	199,500	- - -	- - -	199,500
Water Supply Intake	- - -	- - -	13,100	20,500	33,600	- - -	- - -	7,400	- - -	7,400	- - -	- - -	5,700	20,500	26,200
Log Jam Removal	24,300	- - -	- - -	- - -	24,300	24,200	- - -	- - -	- - -	24,200	100	- - -	- - -	- - -	100
TOTAL	2,076,300	1,094,500	69,300	105,900	3,346,000	1,732,900	558,200	30,800	1,500	2,323,400	343,400	536,300	38,500	104,400	1,022,600

a/ Price Base 1976

b/ Relocation cost

August 1977

TABLE 2B - RECREATIONAL FACILITIES ESTIMATED CONSTRUCTION COSTS

Middle Creek Watershed, Kansas

Item	Number	Estimated Unit Cost a/	Total Construction Cost
Access Roads, rock	10,440 lin. ft.	$2.60/lin. ft.	$ 27,100
Parking Areas, rock	212,500 sq. ft.	.11/sq. ft.	23,400
Fence, 4 wire, steel post	7.8 mi.	$4,000/mi.	31,200
Pipe, 24" corrugated metal	288 lin. ft.	$ 27/lin. ft.	7,800
Picnic table, 7' metal frame on concrete slab	30 ea.	$ 170	5,100
Grills, metal	20 ea.	$ 75	1,500
Toilets, concrete vault	4 ea.	$4,500	18,000
Boat ramps, 100' X 14' concrete	2 ea.	$5,000	10,000
Boat docks	2 ea.	$3,500	7,000
Well, water	4 ea.	$5,000	20,000
Refuse containers, 2 cu. yd. on concrete slab	6 ea.	$ 300	1,800
Earth fishing piers, 125' long, with riprap	8 ea.	$5,000	40,000
Seeding; and tree and shrub planting	160 Ac.	$ 70	11,200
Subtotal			204,100
Contingencies			30,500
TOTAL			$234,600

a/ Price Base 1976

August 1977

TABLE 3 - STRUCTURE DATA
FLOODWATER RETARDING AND MULTIPLE PURPOSE STRUCTURE

Middle Creek Watershed, Kansas

ITEM	UNIT	STRUCTURE NUMBER								TOTAL
		1 - MP	2	3	4	5	6	7	8	
Class of Structure		b	a	a	a	a	a	a	a	xxxx
Drainage Area	Sq. Mi.	7.41	3.66	3.24	1.76	4.56	2.94	3.70	2.53	29.80
Curve No. (1-day)(AMC II)		77	77	77	77	77	77	77	77	xxxx
TC	Hours	2.00	1.00	1.50	1.00	2.00	1.50	1.50	1.50	xxxx
Elevation Top of Dam	Feet (MSL)	997.0	1,004.5	964.8	964.0	953.7	926.3	913.3	861.5	xxxx
Elevation Crest Emergency Spillway	Feet "	991.3	999.5	959.8	959.0	948.2	920.8	907.0	856.0	xxxx
Elevation Crest Low Stage Inlet	Feet "	985.4	989.4	951.5	950.7	937.0	908.0	889.2	843.5	xxxx
Maximum Height of Dam	Feet	51.3	34.5	30.8	27.5	35.8	44.3	56.3	36.5	xxxx
Volume of Fill	Cu. Yds.	347,000	125,000	101,000	62,000	204,000	123,000	160,000	46,000	1,168,000
Total Capacity	Ac. Ft.	5,493	1,192	942	486	1,439	877	1,209	729	12,367
Sediment Submerged	Ac. Ft.	632	282	257	116	321	253	298	195	2,354
Sediment Aerated	Ac. Ft.	--	31	28	13	35	28	33	21	189
Beneficial Use[b/]	Ac. Ft.	3,000	--	--	--	--	--	--	--	3,000
Retarding	Ac. Ft.	1,861	879	657	357	1,083	596	878	513	6,824
Surface Area										
Sediment pool	Acres	95	48	43	22	50	28	27	32	345
Beneficial use pool[c/]	Acres	281	--	--	--	--	--	--	--	281
Retarding pool	Acres	360	128	138	68	160	81	77	51	1,063
Principal Spillway										
Rainfall Volume (areal)(1-day)	Inches	7.1	6.4	6.4	6.4	6.4	6.4	6.4	6.4	xxxx
Rainfall Volume (areal)(10-day)	Inches	12.8	11.2	11.2	11.2	11.2	11.2	11.2	11.2	xxxx
Runoff Volume (10-day)	Inches	7.41	6.03	6.03	6.03	6.03	6.03	6.03	6.03	xxxx
Capacity of Low Stage (max.)	c.f.s.	200	92	81	44	112	72	93	66	xxxx
Frequency Operation-Emergency Spillway	% chance	2	2	4	4	2	4	2	4	xxxx
Size of Conduit	Diameter	36"	30"	30"	24"	30"	24"	30"	24"	xxxx
Emergency Spillway										
Rainfall Volume (ESH)(areal)	Inches	8.50	8.50	5.90	5.90	8.50	8.50	8.50	5.90	xxxx
Runoff Volume (ESH)	Inches	5.73	5.73	3.39	3.39	5.73	5.73	5.73	3.39	xxxx
Type		Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	Veg.	xxxx
Bottom Width	Feet	40	100	40	40	100	80	100	40	xxxx
Velocity of flow (Ve)	Ft./Sec.	2.77	5.6	a/	a/	5.7	7.2	9.5	a/	xxxx
Slope of Exit Channel	Ft./Ft.	0.040	0.040	0.040	0.150	0.040	0.046	0.075	0.150	xxxx
Maximum Water Surface Elevation	Feet (MSL)	992.1	1,001.0	a/	a/	949.7	922.9	909.2	a/	xxxx
Freeboard										
Rainfall Volume (FH)(areal)	Inches	14.5	14.5	8.5	8.5	14.5	14.5	14.5	8.5	xxxx
Runoff Volume (FH)	Inches	11.44	11.44	5.73	5.73	11.44	11.44	11.44	5.73	xxxx
Maximum Water Surface Elevation	Feet (MSL)	996.3	1,004.5	962.0	960.9	953.7	926.3	913.3	859.0	xxxx
Capacity Equivalents										
Sediment Volume	Inches	1.60	1.60	1.65	1.38	1.46	1.79	1.68	1.60	xxxx
Retarding Volume	Inches	4.71	4.50	3.80	3.80	4.45	3.80	4.45	3.80	xxxx

a/ Emergency spillway hydrograph is contained below crest of emergency spillway
b/ Includes 2,166 Ac. Ft. for recreation, 325 Ac. Ft. for agricultural water, and 509 Ac. Ft. for municipal and industrial
c/ Municipal and industrial pool

August 1977

TABLE 4 - ANNUAL COST

Middle Creek Watershed, Kansas

(Dollars) a/

Evaluation Unit	Amortization of Installation Cost b/	Operation and Maintenance Cost	Total
7 Floodwater Retarding Structures	110,800	6,100	116,900
1 Multipurpose Structure Including Water Supply Intake	76,800	3,000	79,800
Recreational Facilities	24,700	21,100 c/	45,800
Log Jam Removal	1,600	100	1,700
Subtotal	213,900	30,300	244,200
Project Administration	52,300		52,300
GRAND TOTAL	266,200	30,300	296,500

a/ Price Base 1976
b/ 100 Years @ 6 3/8 percent interest
c/ Includes $6,100 for replacement of recreation facilities

August 1977

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Middle Creek Watershed, Kansas

(Dollars)[a/]

Item	Estimated Average Annual Damage		Damage Reduction Benefits
	Without Project	With Project	
Floodwater			
Crop and pasture	275,000	97,800	177,200
Other agriculture	35,700	10,900	24,800
Non-agricultural			
Road and bridge	32,500	10,300	22,200
Subtotal	343,200	119,000	224,200
Erosion			
Flood plain scour	84,500	39,200	45,300
Indirect	44,300	16,300	28,000
TOTAL	472,000	174,500	297,500

a/ Price Base: WRC July 1976 Current Normalized for crop and pasture, and flood plain scour; Other items = 1976 prices

August 1977

TABLE 6 - COMPARISON OF BENEFITS AND COSTS

Middle Creek Watershed, Kansas

(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS [a]					Average Annual Cost [c]	Benefit Cost Ratio
	Damage Reduction [b]	More Intensive Land Use	Recreation	Agricultural, Municipal and Industrial Water Supply	Total		
7 Floodwater Retarding Structures; 1 Multi-purpose Floodwater Retarding, Water Supply, and Recreation Structure; and Log Jam Removal	297,500	33,200	112,500	57,100	500,300	244,200	2.1:1
Project Administration						52,300	
GRAND TOTAL	297,500	33,200	112,500	57,100	500,300	296,500	1.7:1

a/ Price Base: Agricultural is current normalized (WRC - July, 1976); all other is current.
b/ From Table 5
c/ From Table 4

August 1977

ENVIRONMENTAL IMPACT STATEMENT

MIDDLE CREEK WATERSHED

Linn and Miami Counties, Kansas

USDA-SCS-EIS-WS-(ADM)-77-1-(F)-KS

MIDDLE CREEK WATERSHED

Linn and Miami Counties, Kansas

FINAL ENVIRONMENTAL IMPACT STATEMENT

Robert K. Griffin
State Conservationist
Soil Conservation Service

SPONSORING LOCAL ORGANIZATIONS

Middle Creek Watershed Joint District No. 50
LaCygne, Kansas 66040

Linn County Conservation District
Box 88
Mound City, Kansas 66056

Miami County Conservation District
Box 248
Paola, Kansas 66071

City of Louisburg
Box 487
Louisburg, Kansas 66053

Miami County Rural Water District No. 2
121 West Peoria
Paola, Kansas 66071

State of Kansas, Forestry, Fish and Game Commission
Pratt, Kansas 67124

October 1977

Prepared by

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
760 South Broadway
Salina, Kansas 67401

E-1

USDA ENVIRONMENTAL IMPACT STATEMENT

Middle Creek Watershed Project

Linn and Miami Counties, Kansas

Prepared in Accordance with
Sec. 102(2) (C) of P.L. 91-190

SUMMARY

I Final

II Soil Conservation Service

III Administrative

IV Description of project purpose and action. A project for watershed protection, flood prevention, water supply, and public recreation in Linn and Miami Counties, Kansas, to be implemented under authority of the Watershed Protection and Flood Prevention Act (P.L. 566, 83d Congress, 68 Stat. 666) as amended.

This project will include conservation land treatment, log jam removal, 7 floodwater retarding dams, and 1 multipurpose structure for floodwater retardation, water supply, and public recreation.

V Summary of impacts. Average annual flood damage will be reduced 63 percent in the watershed. Soil loss by erosion will be reduced. Floodwater and sedimentation damages will be reduced on 4,501 acres of Middle Creek flood plain. Reservoirs will increase landscape diversity, improve pond fishery resources, and provide additional habitat for waterfowl. Six hundred twenty-five acres, including a 281-acre reservoir, will be available for public recreation and wildlife management. Rural area development will be advanced through increased farm incomes and employment opportunities, higher land values, decreased flood related expenses, and a more stable economy. An added supply of water will be available for agricultural, municipal, and industrial use.

Agricultural use and terrestrial wildlife habitat will be lost on sediment and beneficial use pools (531 acres) and disrupted by periodic flooding of detention pools (532 acres). Agricultural uses will be lost on dams and spillways (79 acres). Terrestrial wildlife use of dams and spillways will be reduced until revegetation occurs. Approximately 85 percent of the wildlife habitat losses will be replaced by mitigation features of the project. Nine and six-tenths miles of intermittent stream will be inundated permanently. Five persons will be eligible for relocation payments. Traffic, litter, and noise will increase around the multipurpose reservoir.

VI List of alternatives:

1. No project; allow present trends to continue.

2. Accelerated land treatment only.

3. Multipurpose structure, log jam removal, accelerated land treatment, and seven floodwater retarding structures (NED plan).

4. Multipurpose structure, accelerated land treatment, log jam removal, fish and wildlife habitat management, land use planning, and fish management program (EQ plan).

5. Multipurpose structure and accelerated land treatment.

6. Multipurpose structure, flood flow channel, and accelerated land treatment.

7. Eight single purpose floodwater retarding structures, log jam removal, and accelerated land treatment.

VII Agencies from which written comments were requested:

Department of the Army*
Department of Commerce
Department of the Interior*
Department of Health, Education, and Welfare*
Department of Transportation
Office of Equal Opportunity, USDA*
Forest Service, USDA*
Environmental Protection Agency*
Federal Power Commission

Governor of Kansas*
Division of State Planning and Research, Department of Administration, State of Kansas (Clearinghouse)
Natural Resources Defense Council
Friends of the Earth
Environmental Defense Fund
National Wildlife Federation
National Audubon Society
Environmental Impact Assessment Project
State Historic Preservation Officer

*Replies were received from these.

VIII Draft statement transmitted to CEQ on April 15, 1977.

USDA SOIL CONSERVATION SERVICE
FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR

Middle Creek Watershed, Kansas

AUTHORITY

Installation of this project constitutes an administrative action. Federal assistance will be provided under authority of P.L. 83-566, 83d Congress, 68 Stat. 666, as amended.

SPONSORING LOCAL ORGANIZATIONS

Middle Creek Watershed Joint District No. 50

Linn County Conservation District

Miami County Conservation District

City of Louisburg, Kansas

Miami County Rural Water District No, 2

Kansas Forestry, Fish and Game Commission

PROJECT PURPOSES AND GOALS

Major goals of the watershed sponsors are:

Watershed Protection (Conservation Land Treatment)

1. Improve use and management of water resources by landowners and operators.

2. Reduce soil loss to acceptable levels on all land.

3. Improve soil productivity and water holding capacity of agricultural land.

4. Reduce sediment delivery to the Marais des Cygnes River.

5. Reduce annual fire loss to acceptable levels for forest lands and grasslands.

Flood Prevention

1. Reduce flood damage to crops, homes, personal property, animals, buildings, wells, fences, roads, bridges, and public utilities in the flood plain to the maximum extent feasible.

2. Reduce sediment deposits in stream channels and on the flood plain.

3. Reduce stream bank erosion and flood plain scour.

4. Increase low flow in Middle Creek. Reduce stream pollution.

Fish and Wildlife and Recreation

1. Provide facilities for public recreation in the watershed.

2. Provide areas for wildlife management and protection.

3. Increase hunting and fishing opportunity in the watershed.

Water Supply

1. Provide water for recreational use.

2. Provide water to meet agricultural and future municipal-industrial needs.

PLANNED PROJECT

Land Treatment Measures

Resource management systems will be installed on 1,700 acres of cropland, 1,910 acres of grassland, and 536 acres of forest land during the project installation period.1/* Four detention dams controlling 2.8 square miles are planned as land treatment measures at locations shown on the Project Map (Appendix H). More intensive fire control will be initiated on 13,478 acres of grassland and forest land. See Appendix F for a description of conservation practices for resource management systems.

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* See list of selected references.

Installation of land treatment measures is a voluntary act by individual landowners and operators. The watershed district and conservation districts assist with installation of conservation practices. They contact landowners and operators and urge them to establish conservation practices on their farms. This includes informing people about the watershed program and its progress. It is important that landowners and operators understand that land treatment measures benefit them individually and are required before the floodwater retarding dams can be installed. Technical assistance for installation of conservation practices will be provided by the Soil Conservation Service.

Forestry technical assistance will be provided by the Kansas State and Extension Forester in cooperation with the U. S. Forest Service through PL-566 and the Cooperative Forest Management Programs to serve forest land needs for the project. An educational program is planned to inform rural residents of the benefits of excluding livestock from forest land and shelterbelts. A forestry work plan2/ was developed for Middle Creek Watershed by the Kansas State and Extension Forester, cooperating with the Forest Service.

The watershed is protected by rural fire districts. Equipment procurement, training, and education in fire prevention and control will continue. Technical assistance for fire control measures will be provided by the Kansas State and Extension Forester through the Cooperative Fire Control Program.

Structural Measures - Reservoir Type Structures

Seven floodwater retarding dams and 1 multipurpose floodwater retarding, water supply, and recreational structure with recreational facilities will be installed at locations shown on the Project Map (Appendix H). All dams will be earth-fill structures with a design life of 100 years. A typical dam with drop inlet principal spillway is shown in Appendix D.

Dam foundations are alluvium (mostly clay soils) overlying shales and limestones of Pennsylvanian age. Alluvium thickness in the flood plain varies from 10 to 30 feet. Swope and Dennis limestones are prominent abutment outcrops.

Principal spillways of dams will be reinforced concrete or material of comparable quality and strength. Each spillway will have a single-stage ungated inlet near the top

of the sediment pool and will discharge into a stilling basin designed to return water to the natural channel at a safe velocity. Release rates will average 20.0 cubic feet per second per square mile (csm) of drainage area and will not exceed present downstream channel capacities. Principal spillways will have drawdown pipes (minimum diameter 8 inches) with control valves to permit draining the reservoirs. Principal spillways will lie on yielding alluvium except at Structure Nos. 6 and 7 where they will lie on non-yielding limestone.

All dams will have emergency spillways to discharge runoff safely when reservoir storage and principal spillway capacities are exceeded. In any one year the chance of operation of the emergency spillway at any given site is 4 percent or less.

Emergency spillway excavations at Structure Nos. 2, 3, 4, and 5 will include shale, sandstone, and clay; all readily usable in the dams. Limestone excavation is expected at Structure Nos. 6, 7, and 8.

Borrow material in sediment pools at structure sites is mostly clay (CL). Sediment pools contain ample material suitable for all planned dams except Structure Nos. 6 and 7 where nearby GC material may also be needed.

The 8 reservoirs will provide detention storage varying from 3.80 to 4.71 inches of runoff from their respective drainage areas. Runoff from 29.80 square miles, 42.7 percent of the watershed, will be controlled. Drainage areas of individual structures vary from 1.76 to 7.41 square miles. Combined floodwater retarding volume will be 6,824 acre feet with a combined temporary surface area of 1,063 acres. Sediment storage volumes range from 1.38 to 1.79 inches from their respective drainage areas. Aggregate sediment storage volume for all structures will be 2,543 acre feet which is the expected 100-year accumulation. Combined surface area of the sediment pools will be 345 acres. Sediment pools will usually be filled with water.

At Multipurpose Structure No. 1 rock excavation is expected for part of the emergency spillway. The emergency spillway foundation will be in shale and limestone. Borrow material in the sediment pool is mostly clay (CL) although some silt (MH) and gravelly clay (GC) have been found. The sediment pool contains ample borrow. The multipurpose structure will provide 557 acre feet for municipal and

industrial water, 277 acre feet for agricultural water, and 2,166 acre feet for recreational water. The beneficial use pool will have a surface area of 281 acres. Maximum initial water depth will be 40 feet. Average depth will be 13 feet initially and 11 feet at the end of design life. See Table 3 in the Watershed Plan for complete structure data.

Structural Measures - Channels

Approximately 9 piles of loose debris and logs choking Reaches 1 and 2 of Middle Creek will be removed. Actual number and location of obstructions removed will be determined when the work is done (see Appendix E, Figure 5, for a typical log jam). No other work on watershed channels is planned.

Structural Measures - Public Recreational Facilities

Land totaling 625 acres will be obtained in fee title at the multipurpose site. This includes 281 acres for recreation and water supply, 79 acres for floodwater storage, 236 acres to facilitate use of recreational facilities, and 29 acres for the dam and spillway. Flowage easements will be obtained on 5 additional acres.

The reservoir and related facilities will be constructed to accommodate 50,000 recreational visits per year. Facilities for recreational use will include access roads, parking areas, drinking water, camp and picnic sites, boat docks and ramps, and vault toilets. Facilities will be usable by physically handicapped people. Arrangement of recreational facilities is shown on the Public Recreation Development Map (Appendix H).

The Kansas Forestry, Fish and Game Commission will provide public access to recreational facilities at the multipurpose reservoir. All recreational facilities will be installed to meet or exceed requirements of state and local public health agencies.3/

Structural Measures - General

The Kansas Department of Transportation is planning to rebuild U.S. Highway 69 through the area of Multipurpose Structure No. 1. The two projects are being coordinated by their respective sponsors. Approximately 0.1 mile of township road through the upper end of the floodwater retarding pool will be raised and one bridge modified. Two bridges will be modified and 0.3 mile of road will be raised

at Structure No. 2. One bridge will be modified and 0.13 mile of road will be raised at Structure No. 5. One bridge will be modified, 0.25 mile of road will be raised, and 1 farmstead diked at Structure No. 6.

Due to land acquisition for Multipurpose Structure No. 1, two farm operations, involving five persons will be eligible for relocation assistance. Neither relocation involves dwellings.

The following measures will be taken to partially offset wildlife habitat loss at the 8 structure sites:

Woodland Habitat (riparian and upland) - Fencing and managing areas of existing woodland at M.P. No. 1 to exclude livestock and increase the value to wildlife (179 H.U.*). Small tracts at other sites will be planted with trees and managed in a similar manner. (934 H.U.)

Herbaceous Habitat (range, pasture, and cropland) - Fencing and managing areas of existing native grasses and forbs at M.P. No. 1 for wildlife (987 H.U.). All 8 dams and spillways will be seeded, fenced, and managed in a similar way (790 H.U.).

Odd Area Habitat - Fencing and managing existing areas of grasses, forbs, shrubs, and trees at M.P No. 1 for wildlife (67 H.U.). Additional areas at other sites will be established and managed similarly (298 H.U.).

Habitat units listed above are based on a preliminary tri-agency evaluation.26/ Actual values may vary depending on assessments to be made at each site before construction. Measures to be installed will compensate for at least 85 percent of the net wildlife habitat losses due to structure installation. Flexibility is retained by sponsors to take advantage of nearby off-site, as well as on-site, opportunities for habitat development. Details of assessment procedures and U.S. Fish and Wildlife Service recommendations are included in a letter report.4/

The need and methods for water and air pollution abatement during construction will be determined on a

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* H.U. (Habitat Units) equals number of acres times quality rating. Quality ratings are numerical values from 1 to 10. Poor is 1; excellent is 10. Example: Five acres of woodland with a quality rating of 7 would equal 35 H.U.

site-by-site basis. Abatement measures may include dry stream crossing, temporary revegetation, watering for dust control, controlled burning, and sediment control basins.

The Kansas State Historical Society in consultation with the State Historic Preservation Officer and Kansas State Archeologist have found no cultural resources requiring preservation. To avoid any possible loss of undetected cultural resources from the project, Soil Conservation Service field personnel will be alerted to watch for signs of cultural resources during project construction. If items of archeological or historical interest are found, the Soil Conservation Service will immediately consult with the State Historic Preservation Officer and the Denver Office of Archeology and Historic Preservation, National Parks Service, in accordance with the provisions of 7 CFR 656.7.

Operation and Maintenance

Landowners and operators will maintain land treatment measures including detention dams on their farms under voluntary agreements with their conservation districts. Conservation district representatives will make periodic inspections of land treatment measures to encourage landowners to perform needed maintenance.

Technical assistance to landowners and rural fire districts for operating and maintaining forestry and fire control measures will be provided by the Kansas State and Extension Forester in cooperation with the Forest Service.

Agreements for operation and maintenance of structures, associated wildlife habitat and other vegetative measures, and recreational facilities will be made between sponsors and the Soil Conservation Service before construction begins. These agreements will conform to the Kansas Watersheds Operation and Maintenance Handbook and will include provisions for retention and disposal of property acquired or improved with P.L. 566 cost sharing.

Municipal, industrial, and agricultural water in Multipurpose Structure No. 1 will be stored between elevations 985.4 and 982.3. Water storage for public recreation will be between elevations 982.3 and 969.2. Top of the sediment pool will be at elevation 969.2. The reservoir will stay full about 80 percent of the time and will contain 3,000 acre feet of water (281 surface acres). It will contain 632 acre feet (95 surface acres) or more 98 percent of the time assuming 0.97 million gallons per day (mgd) are

being withdrawn. Miami County Rural Water District No. 2 will operate and maintain the water supply works and will notify the Soil Conservation Service when the water surface drops below elevation 982.3.

Floodwater retarding dams and associated vegetative measures will be operated and maintained by the watershed district at an estimated annual cost of $6,100. The multipurpose structure (excluding water supply works, recreational facilities, and areas reserved for wildlife management) will be operated and maintained by the watershed district. The watershed district will be responsible for maintaining drawdown control valves and passing natural streamflow through all floodwater retarding structures to meet downstream water rights as provided by the Kansas Water Appropriation Act.

Estimated annual cost of operation and maintenance for the multipurpose structure is $3,000. Recreational facilities and fish and wildlife habitat measures for the multipurpose development will be operated, maintained, and replaced by the Kansas Forestry, Fish and Game Commission at an estimated annual cost of $21,100 of which $6,100 is for replacement.

After log jam removal the Middle Creek channel will be kept free from similar obstructions by the watershed district at an estimated cost of $100 per year.

Kinds of maintenance expected frequently are repairs to fences, clearing of debris, repair or replacement of recreational facilities, etc. Repairs to major items such as dams and spillways are expected infrequently. Technical assistance will be provided by the Soil Conservation Service.

Structural measures will be inspected annually, after unusually heavy rainfall, and after any other unusual condition that might adversely affect their operation, maintenance, or safety. The Soil Conservation Service and sponsors responsible for operation and maintenance will make joint annual inspections for a three-year period following completion of construction. Thereafter, annual inspections will be made for the life of the structures by the sponsors. Records of inspection will be kept by the watershed district. Provisions will be made for access to inspect the structures at any time.

Items inspected will include, but not be limited to: the principal spillway and its appurtenances, emergency

spillway, earth fill, vegetative cover of the earth fill and emergency spillway, fences installed as part of the structural measures, wildlife habitat measures, and recreational facilities.

The 7 single purpose sites have no likelihood of public recreational use. Access to them will be controlled by landowners. The watershed district will notify landowners of the need for sanitary facilities if significant recreational use occurs; they will also notify the Kansas Department of Health and Environment. Water quality monitoring may be required.

Recreational facilities at the multipurpose site will be operated and maintained to accommodate such activities as picnicking, camping, hunting, fishing, and boating. Swimming and water skiing will not be allowed. Water quality, sanitation, and other health-related conditions will be maintained by the Kansas Forestry, Fish and Game Commission to meet or exceed requirements of state and local public health agencies. Vectors will be controlled when necessary through methods recommended by the Kansas Department of Health and Environment.

Project Costs

Total project installation costs will be $4,663,200 of which P.L. 566 funds will pay $3,190,400. Total construction cost will be $2,074,300 of which $1,749,600 will be paid by P.L. 566.

ENVIRONMENTAL SETTING

Physical Resources

Middle Creek is a left bank tributary to the Marais des Cygnes River in east central Kansas. Middle Creek Watershed includes 46,765 acres. There are 12,353 acres in Linn County and 34,412 acres in Miami County.

This project concerns 44,691 acres. The remaining 2,074 acres lie between the lower boundary of the project area and the Marais des Cygnes River. Appendix H shows the watershed location in the state.

There are no incorporated cities in the watershed. New Lancaster, an unincorporated town with only a few buildings, is in the north central section. LaCygne, population 989, is at the west edge of the southern part of the watershed. Louisburg, population 1,033, lies 8 miles north of the watershed. The Kansas City metropolitan area begins 30 miles to the north.

The 1970 watershed population is estimated at 602. Populations in 1970 for Linn and Miami Counties were 7,770 and 19,254 respectively.5/ Between 1960 and 1970 both counties experienced a net population loss: 6.1 percent for Linn and 3.2 percent for Miami. These figures correspond to a 3.1 percent increase in state population during the same period.

By 1973, however, Miami County population was estimated at 21,300 by the Bureau of the Census; an increase of 10.6 percent. Also, rural population has increased since 1960 in almost half of the Miami County townships.

The watershed is in the Marais des Cygnes subregion of the Lower Missouri River Basin, designated aggregated sub-area 1011 by the Water Resources Council.

The watershed lies in the path of alternate masses of warm, moist air moving north from the Gulf of Mexico and currents of cold, comparatively dry air moving south from the polar region. Consequently this area is subject to extended periods of below normal rainfall with resulting drought conditions. Average annual precipitation at LaCygne is 39.20 inches. Variations from 21.42 to 64.57 inches have occurred. Rainfall during the 6-month growing season accounts for 70 percent of the total. Recorded temperature extremes are 115° and -23° F. Average maximum July and minimum January temperatures are 91° and 21° F respectively.6/ This weather pattern is typical of the entire Osage Plains section of the Central Lowlands in which the watershed lies.

Flooding is common along Middle Creek. Sheet erosion occurs in the upland, scour in the flood plain, and sediment deposition in ponds and stream channels.

Topography in the watershed ranges from steeply rolling, dissected upland to flat, mile-wide flood plain. Vertical relief is 350 feet.

Rock outcrops are of Upper Pennsylvanian geologic age. They are capped on the upland by a mantle of sand, silt, and clay of Recent age. The oldest formation is the Pleasanton Group. This formation, composed of sandstone, shale, and thin limestone beds, occupies the Linn County portion of the watershed.

Interbedded limestone and shale formations are outcrops in Miami County. Two massive limestone members, the Swope and Dennis, each 30 to 35 feet thick, are prominent outcrops along valleys. Alluvial deposits of silt and clay 10 to 30 feet thick lie along terraces and on the flood plain.

The Summit-Catoosa-Grundy soil association occupies the upland in this watershed. Summit soils occur on gently sloping to sloping positions below areas of Grundy soils and on foot slopes. Catoosa and Grundy soils are on nearly level to sloping ridgetops with Grundy occupying the highest part of the landscape. Summit soils are the most extensive. They are deep, dark, moderately well-drained soils with silty clay loam surface layers and slowly permeable clay subsoils. Catoosa soils are also extensive. They are moderately deep over limestone and are well drained. These dark soils have silt loam surface layers and moderately permeable silty clay loam subsoils. Grundy soils are the least extensive. They are deep, dark, somewhat poorly drained soils with silt loam surface layers over slowly permeable silty clay subsoils.

The Verdigris-Osage-McCune association occupies stream valleys. Verdigris and Osage soils occur on flood plains and McCune soils on low terraces. Verdigris soils are the most extensive. They are deep, dark, well-drained soils with silt loam surface layers and moderately permeable silt loam subsoils. Osage soils are also extensive. They are deep, dark, poorly drained soils with silty clay surface layers over very slowly permeable silty clay subsoils. McCune soils are the least extensive. They are deep, light colored, somewhat poorly drained soils with silt loam surface layers over slowly permeable silty clay loam subsoils.

A detailed soil survey is being conducted in Linn and Miami Counties. The soil maps may be examined in the Soil Conservation Service field office in each county. Soil names used in this survey and delineations on the soil maps are subject to change pending final soils correlation of Linn and Miami Counties.

Land use in the watershed is shown in Figure 1.

Figure 1

Land Use

Land Use	Upland		Flood Plain		Total	
	Acres	%	Acres	%	Acres	%
Cropland	14,026	35	2,792	62	16,818	38
Grassland (range & pasture)	18,280	46	851	19	19,131	43
Forest land	6,570	16	723	16	7,293	16
Miscellaneous	1,314	3	135	3	1,449	3
Total	40,190	100	4,501	100	44,691	100

Timber acreage has consistently declined on the flood plain in the past. Woodland decreased 1.6 percent per year from 1958 through 1967. More than 500 acres have been cleared since 1965. This trend will continue. Small, irregular tracts incompatible with modern farm machinery are not likely to be cleared.

Middle Creek Watershed contains 31,612 acres designated as prime farm land. One thousand four hundred fifty acres are in the flood plain. The flood plain includes 2,916 additional acres which would be prime farm land except for frequent flooding (averaging once or more in two years). No Middle Creek land is considered unique farm land.

Mineral resources in the watershed include oil, gas, stone, sand, and gravel. Major efforts to produce gas and oil within the watershed occurred between 1910 and 1930. Production proved minor and most wells have been inactive since 1950. In 1973 two wells were producing oil by enhanced recovery.7/ Production for these two wells in 1973 was 55,000 barrels.

Although coal deposits in Linn County are among the most substantial in the state, no coal is produced in the watershed. Major coal reserves in Linn County are south and east from the watershed.8/ Miami County has little known coal reserve.

No rock or sand and gravel quarries are presently operating in the watershed.

The quantity of ground water in the watershed is only marginally adequate for present uses.9/ 10/ Wells in the flood plain as far north as LaCygne can produce 10 to 100 gallons per minute. Wells in all other parts of the watershed yield less than 10 gallons per minute. In the upland, clayey topsoil limits percolation to underlying formations of interbedded shale and limestone. Fractured limestone makes a fair aquifer but tends to transport water. Shale holds relatively small quantities of water. Weathered shale holds more water but releases it reluctantly. Contact springs, common where limestone overlies shale, feed streams even in fairly dry weather.

Ground water quality in Linn and Miami Counties is varied as illustrated by tests of fifty wells by the Kansas Geological Survey.9/ 10/ Only two wells tested are in this watershed. Water from these wells does not meet U.S. Public

Health Service Drinking Water Standards for total dissolved solids, iron, and chloride.11/ The presence of the high chloride concentration in this water indicates possible pollution from brine or other introduced waste. High chloride concentrations are usually found below 100 feet in this area.

From headwaters in east central Miami County, Middle Creek flows south into Linn County where it empties into the Marais des Cygnes River 5.5 miles northwest from Trading Post, Kansas. Middle Creek is a mature stream with a meandering channel about twice as long as the most direct route. The watershed has 32 miles of perennial stream and 113 miles of intermittent stream. Ephemeral streams were not measured. The mainstem is all perennial in reaches I through V, plus about one mile at the bottom of reach VI.

Ponds constitute a large portion of the surface water in the watershed. Approximately 99 percent of these ponds have less than 5 surface acres but contribute 75 percent of the total surface area and 94 percent of the total shoreline for ponds. Total storage is estimated at 725 acre feet.

An assessment of Middle Creek surface water quality shows it is generally better than state requirements for Class A water except for fecal coliform content; which normally meets Class B requirements.3/ Class A water is suitable for all uses, including direct contact activities such as swimming. Class B water is suited to all but direct contact uses. Appendix G contains details of the surface water quality assessment.

There are no wetlands in the watershed included in the U.S. Department of Interior Circular 39, "Wetlands in the United States."12/ Many ponds in the watershed would meet criteria for Type 5 wetlands12/ if they were not used for stockwater. This activity precludes development of necessary emergent vegetation. See the "Environmental Setting" section, Projects of Other Agencies, for a discussion of the Marais des Cygnes Wildlife Management Area which contains Types 1, 4, and 5 wetlands.

Economic Resources

Nearly all land in the watershed is privately owned. Average farm size is 265 acres for Linn and Miami Counties.

Nearly 90 percent of the estimated 275 farming units partially or totally within the watershed are operated by

the owner or a part owner. There are 46 family farms partly or totally in the flood plain. The number of farms in Linn and Miami Counties has been decreasing by 2 to 3 percent per year. No farms in the watershed use 1 1/2 or more man years of hired labor.

Most farms are diversified. Typically they produce crops and livestock. Much of the corn, sorghum, and alfalfa produced is used to feed livestock. Major cash crops include wheat, corn, sorghum, and soybeans. Crop yields on the flood plain are good, consistently at or above county and state averages. Crop yields in the uplands are lower, usually below state and county averages.

Woodlands are mostly in small tracts of 40 acres or less with only about 20 percent of the trees suitable for commercial production. The few larger tracts have economic potential for timber production that could be developed.

Normal markets for timber products exist in the watershed area. Sale of forest products in Linn and Miami Counties grossed $47,400 in 1969.2/ Most of this income was from saw and veneer logs, although markets also exist for pecan nuts and walnuts.

Projected gross value of year 2000 flood-free production for the composite flood plain acre is estimated at $218. Current agricultural land values per acre are: upland cropland $500, bottomland cropland $600, and pastureland $400.

Transportation in the watershed is by the usual grid of county and township roads. The secondary road grid leads to U.S. Highway 69 on the east and Kansas Highway 135 on the south. The San Francisco and St. Louis Railroad at LaCygne provides marketing transportation for watershed residents.

Median income for watershed residents, except for craftsmen and operatives, is below state and national medians. Median income for rural residents in Linn and Miami Counties was 2 percent greater than the state median ($7,050) in 1970. Median family income for all families in Linn and Miami Counties was $7,869 in 1970. This is 90 percent of the median income for all families in Kansas in the same year. Major sources of income are sale of agricultural products and off-farm jobs.

The percentage of farm operators working 100 or more days off the farm is increasing. Concurrently the percentage of farms with gross income less than $2,500 is decreasing. The number of farm operators has been decreasing with a corresponding increase in farm size.13/

The employment level for Linn and Miami Counties in 1960 was 97 percent. In 1960 employment levels for Kansas and the United States were 96 percent and 95 percent respectively. Employment levels in 1970 were: Miami County, 97 percent; Linn County, 98 percent; Kansas, 96 percent; and the United States, 96 percent.

Plant and Animal Resources

Inventories 1/ show 68 species of woody plants, 30 species of native grasses, 66 species of forbs, 46 species of invertebrates, 32 species of fish, 13 species of amphibians, 38 species of reptiles, 59 species of birds (breeding residents only), and 39 species of mammals present in the watershed.

No nationally threatened or endangered species are known to live in the watershed. Some species are on the edge of their range and therefore uncommon in this area.

Middle Creek Watershed exhibits three relatively distinct types of aquatic habitat: (1) intermittent tributaries; (2) perennial mainstem riffle-pool stream; and (3) slow moving perennial mainstem with fairly consistent depth.

Tributary streams in the watershed are generally intermittent (type 1 habitat). Most have shallow channels that are typically eroded to bedrock. Channel bottoms are generally gravel and stone. Erosion has produced pools which retain water over short periods of no flow. This type habitat is common in uplands of Reaches II, III, IV, V, and VI.

In Reach I, Middle Creek provides aquatic habitat described in type 3. Here the slow moving, meandering creek has a silt and detritus bottom. Reaches II and III vary from type 3 to type 2 aquatic habitat.

In Reaches IV and V the mainstem aquatic habitat is described by type 2. Riffles over medium to large stones alternate with pools. Pool bottoms are fine sand, gravel, or clay. Reach VI varies from type 2 to type 1 habitat.

Perennial stream characteristics are summarized in Figure 2.

Figure 2

Perennial Stream Characteristics

Reach	Reach Length (mi.)	Stream Depth (ft.) Ave.	Stream Depth (ft.) Max.	Stream Width (ft.) Ave.	% Character Pools	% Character Riffles	% Character Runs	Gradient (ft./mi.)
I	12.97	4	8-10	25	100			1.5
II	6.53	4	8-10	20	95		5	3.2
III	6.25	3	6- 8	20	90	3	7	3.4
IV	2.18	2	6	15	75	10	13	16.3
V	3.60	2	5	15	68	22	10	14.0
VI	.85	1	4	10	65	35		18.0
Total	32.38	-	-	-	91	5	5	4.8

The Marais des Cygnes River, Marais des Cygnes Wildlife Management Area, and the Miami State Fishing Lake and Game Management Area (see "Projects of Other Agencies") offer fishing opportunities to the public. Studies21/ by the Kansas Forestry, Fish and Game Commission indicate fish production is good in all reaches of Middle Creek. Production is greatest in Reaches II and III. The survey shows that rough fish (primarily drum and carp) are predominant throughout the creek. However, game fish increase both in number and percentage as one proceeds upstream. In the lower portion of the stream, in the type 3 habitat, rough fish yielded 88 percent of the total standing crop. In the riffle-pool area rough fish combined to yield 76 percent of the standing crop. Correspondingly, game fish increased from 11 percent in type 3 habitat to 24 percent in type 2 habitat.

Access to fishing waters in the watershed is generally by landowner permission.

Waterfowl hunting is good. The Marais des Cygnes Wildlife Management Area attracts large numbers of migrating waterfowl to the area. Residents believe Middle Creek Watershed is one of the more productive areas for waterfowl hunting in the state.

Limited trapping occurs in the watershed. Furbearers most commonly trapped are muskrat, beaver, and raccoon.

Residents of Miami and Linn Counties hunt small game more often than the average state resident. The average daily bag in the watershed area is higher than the state average. These facts indicate the area provides good small game hunting.

Recreational Resources

There are 8 public recreational areas in Miami and Linn Counties. Additionally, 1 area is under construction and 7 private areas are operating.

The State Park and Resources Authority14/ shows 19 camping sites, 120 picnic tables, and 841 acres of boating water in Miami and Linn Counties. For more on recreational resources see the sections "Plant and Animal Resources," and "Projects of Other Agencies."

Archeological, Historical, and Unique Scenic Resources

Archeological and historical investigations were made on all floodwater retarding sites by the Kansas State Historical Society in consultation with the State Historic Preservation Officer in 1976 and 1977.15/ No resources were found that might be eligible for the National Register of Historic Places. No further investigations are recommended by the State Historic Preservation Officer.

"Historic Preservation in Kansas, Volume II" as supplemented16/ does not list any sites in the watershed. This publication lists all sites in Kansas that are included in "The National Register of Historic Places."17/

The visual environment of Middle Creek Watershed includes many vistas and scenic sites. They are not particularly unique, but possess qualities to provide interesting visual experiences. Potential has not been developed because of restricted access and lack of landowner motivation.

No public land exists for scenic purposes for the static observer. Areas attractive for picnicking, camping, and other activities are privately owned.

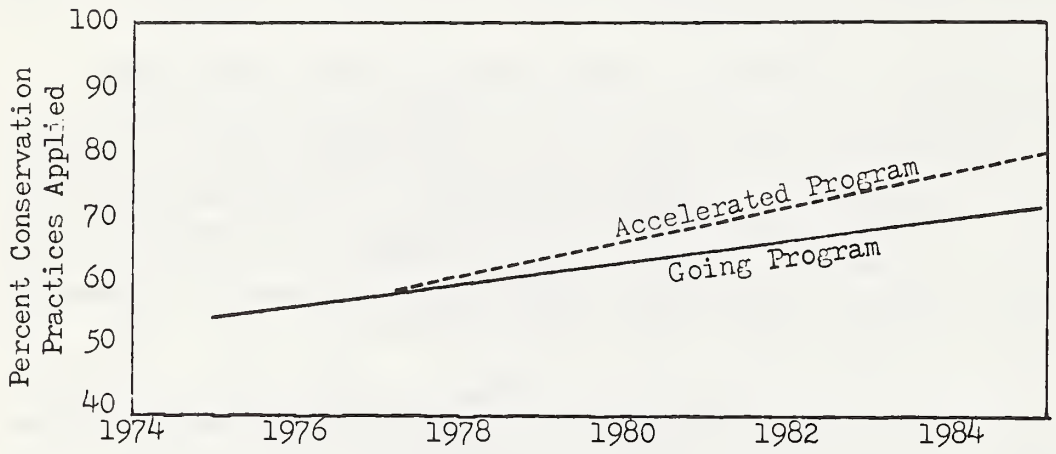
Soil, Water, and Plant Management

Harvested cropland decreased from 1960 to 1970. Since 1970 harvested cropland has increased moderately. No trend is apparent for grassland. Flood plain woodland is decreasing.

Current status of the land treatment program is shown in Figure 3. The figure also projects past rates of application and compares current with anticipated rates. Conservation need is expressed in average percentage of needed practices that have been applied.

Figure 3

Going and Accelerated Land Treatment



Technical assistance for application of conservation land treatment is given by the Soil Conservation Service to cooperators with county conservation districts. Presently 68 percent of the farms (comprising 69 percent of the area) in the watershed are under cooperative agreements with conservation districts.

At least one supervisor each from Miami and Linn County Conservation Districts is serving on the Lake Region Resource Conservation and Development Committee; one supervisor is a member of the steering committee for the Regional Planning Commission; and one supervisor is on the Middle Creek Watershed District Board.

Regular informational activities include organization of a conservation edition section for local newspapers. This annual effort displays news of the year relating to conservation including informational items and recognition of individuals who have made outstanding conservation accomplishments. Preparation of news releases for local media is a continuing concern.

Miami County Conservation District acted as an informational office for the public and for planning engineers during formation and planning of rural water districts in the county. Linn County Conservation District is currently supporting organization of three rural water districts. Information about erosion and sediment control laws has been provided by the Miami County Conservation District to the County Planning Board. In May, 1972, the conservation districts contributed to production of "The Versatile American," a film sponsored by the Kansas Bankers Association showing the interdependence of agriculture with industry. Public meetings on erosion and sedimentation have been sponsored by the conservation districts.

Both conservation districts have started a modern soil survey. Both surveys are expected to be published by 1980.

Potential flood plain and upland crop production versus current production is shown in Figure 4.

Figure 4

Potential vs. Current Production

Crop	Flood Plain b/ Current Yield	Flood Plain b/ Potential Yield c/	Upland Current Yield	Upland Potential Yield c/
Grassland a/				
Tame	220 Lb	350 Lb	150 Lb	210 Lb
Native	91 Lb	115 Lb	80 Lb	110 Lb
Grain Corn	100 Bu	165 Bu	63 Bu	95 Bu
Corn Silage	16 Tn	30 Tn	--	--
Soybeans	38 Bu	55 Bu	23 Bu	35 Bu
Milo	110 Bu	180 Bu	63 Bu	95 Bu
Alfalfa	5.2 Tn	7.5 Tn	3.4 Tn	5.0 Tn
Wheat	45 Bu	65 Bu	34 Bu	50 Bu

a/ Pounds of beef yield per acre
b/ Flood free
c/ Year 2000

Water affects agricultural production efficiency in at least two ways. Too much water increases erosion, causes flooding, saturates soil, and may promote yield reducing diseases. Too little water causes poor growth and development of crops and promotes wind erosion.

Projects of Other Agencies

The Marais des Cygnes Wildlife Management Area lies just south of the watershed. The management area provides good waterfowl hunting. Public fishing is allowed from April 15 until waterfowl hunting seasons open in the fall. Fishing is good when waters are not choked with vegetation. Fish present include channel and bullhead catfish, bass, crappie, bluegill, and green sunfish.

The Miami State Fishing Lake and Game Management Area, 2 miles west of the watershed on the Marais des Cygnes River provides fishing for largemouth bass, bluegill, channel catfish, and crappie. Some day-use facilities and a primitive camping area are provided.

Hillsdale Reservoir, 10 miles northwest of the watershed on Big Bull Creek, is under construction by the Corps of Engineers. When completed, the reservoir will provide flood protection, water supply, and recreation. Water

yield will be 17.38 million gallons per day (mgd). Miami County Rural Water District No. 2 has applied for 0.7 mgd from Hillsdale, but applications from eight other customers total 17.58 mgd.

WATER AND RELATED LAND RESOURCE PROBLEMS

Land and Water Management

There is a need for assistance to landowners and operators in planning and establishing resource conservation measures to reduce erosion and sedimentation and improve wildlife habitat. Good management is becoming more important in relation to land use and productivity, water availability and quality, and concern for our total environment. Landowners and operators need to be economically able, well informed, and socially oriented to cope with these problems.

Floodwater Damage

Floodwater damage has been extensive on agricultural land in the 4,501 acre flood plain. Major flood damage is to growing crops, including forage grasses, that are knocked over and/or covered with sediment. Floods that occur before or shortly after fields have been planted cause extra tillage and reseeding operations. Duration of flooding is generally less than 24 hours. Average frequency of flooding varies from once each year to more than three times per year. Crop and pasture damage averages $275,000 annually.

Flooding damages buildings, fences, and machinery. Many miles of fences are destroyed or damaged even by minor floods. Most buildings have been moved out of the flood plain because of the flooding. Installations such as livestock pens, feed bunks, and stock tanks are frequently damaged. Considerable expense is incurred for cleanup of debris after flooding. Agricultural damage of this type averages $35,700 annually.

Damage to roads, railroads, and bridges averages $32,500 annually. Floods wash away road surfacing, scour road shoulders, fill road ditches with mud, and destroy or damage bridges. There are 7 bridges and 6.5 miles of road subject to damage. Counties and townships are not usually able to make timely replacements and repairs after floods. The work is necessarily spread over a number of years, hence these essential facilities remain in poor condition in the flood plain.

Small localized floods frequently cause considerable damage and inconvenience in the watershed. Those occurring yearly or more often account for 40 percent of the total average annual damage.

Major floods affect everyone in the area due to damaged roads, bridges, utilities, and loss of business to those serving the agricultural community. Such indirect losses are estimated at $44,300 annually.

Floodwater damages total $343,200 annually. Figure 5 shows floodwater damage by evaluation reach. Reach locations are shown on the project map (Appendix H).

Figure 5

Floodwater Damage by Evaluation Reach ($) a/

Damage	Reach I	II	III	IV, V, VI & Tribs.	Total
Crop & Pasture	148,200	80,900	32,400	13,500	275,000
Other Agric.	30,500	2,400	2,000	800	35,700
Road & Bridge	10,700	18,100	600	3,100	32,500
Total	189,400	101,400	35,000	17,400	343,200

a/ Price base: WRC July, 1976, current normalized for crop and pasture; 1976 prices for other items

Although flooding has occurred in every month of the year, 89 percent of the floods normally occur during the growing season (April through September).

The watershed was moderately to severely flooded in 1951, 1952, 1961, 1967, and 1973. The September 4, 1961, storm was largest. Recorded rainfall was 7.96 inches at Paola and 3.96 inches at LaCygne. Estimated frequency of this storm varies from about once every 100 years at the north (upstream) end of the watershed to once every 26 years at the south end. Since the storm came after most crops were harvested, losses were lower than they might have been. A list of damages was attempted after the flood. With this incomplete data it is estimated that the 1961 storm damage was about $662,700.

Erosion Damage

Loss of soil through sheet and rill erosion is a major problem on 3,295 acres of cropland that has been identified as significant sediment source areas. Also, 9,872 acres are eroding at a rate greater than 4 tons per acre per year (maximum tolerable soil loss). Soil losses average 2.6 tons per acre per year throughout the watershed. Erosion reduces crop yields and farm income. Excessive erosion lowers water quality in streams and ponds; and increases sediment deposition in road ditches, farm ponds, stream channels, and on the flood plain.

The channel of the upper reaches of Middle Creek is scoured to bedrock. Stream bank erosion is active on outside banks of bends. Scouring in the flood plain has reduced crop production on 1,225 acres.

Figure 6 shows erosion rates for different land uses by type of erosion.

Figure 6

Soil Loss by Erosion Type

Land Use	Sheet		Gully		Streambank	
	tons/ acre	acres	tons/ acre	acres	tons/ acre	acres
Cropland						
adequately protected	2.1	6,946	--	--	--	--
exceeds tolerable loss	6.4	9,872	21.4	95	2.5	65
Grassland	1.4	19,131	7.9	95	0.5	87
Forest land	0.5	7,293	--	--	--	--
Miscellaneous	0.2	1,449	--	--	--	--

Damage from flood plain scour averages $84,500 annually. Damages from other types of erosion were not individually evaluated.

Sediment Damage

About 7,800 tons of sediment are deposited on the flood plain annually. Areas of sediment deposition are spread

unevenly along the flood plain and vary in size from 1 to 10 acres. It is difficult and sometimes unwise to incorporate flood deposited sediment with original soil. Removal of sediment from fields is difficult and expensive.

About 1,200 tons of sediment are deposited annually in farm ponds. This can significantly affect water volume and quality for individual ponds. Historically, suspended sediment has been significant in Middle Creek. This is evidenced by loss of channel capacity. Channel size of Middle Creek has been reduced by sediment as much as 50 percent in lower reaches (see Appendix E).

Average annual sediment yield to the mouth of the watershed is 55,400 tons or about 87 percent of the total yield.

The monetary damage related to sediment was not evaluated. See Appendix E for more on sediment damage and related problems.

Municipal, Industrial, and Agricultural Water Problems

Present water sources are inadequate to satisfy future needs in eastern Miami County. Population of the potential service area for a water source in this watershed was estimated at 5,844 in a 1970 Kansas Water Resources Board Report.25/ Population projections range up to a 300 percent increase by 2020. Additional water requirement in 2020 is estimated at 1.48 million gallons per day. The City of Louisburg and Rural Water District No. 2 have requested assistance to provide storage for this need.

Ground water yields in the area are low. Where ground water has been tested for quality it has been unsuitable or marginal for most uses. Although surface water quality is generally good, impoundments existing and under construction will not meet future needs. Water from Hillsdale Reservoir would not only be expensive to transport to these customers, but demands of other applicants exceed its expected yield.

Recreational Problems

Additional recreational facilities with public access are needed. Middle Creek Watershed is practically devoid of public recreational facilities. Surrounding areas of Linn and Miami Counties also lack adequate public facilities for camping, hiking, swimming, boating, upland game hunting, and

pond fishing. These problems will intensify with the population growth previously cited. The State Park and Resources Authority14/ elaborates on estimated year 2000 recreational deficiencies.

Plant and Animal Problems

Since 1965 more than 500 woodland acres have been cleared. Removal of riparian timber increases stream bank erosion and causes a reduction in dissolved oxygen associated with higher water temperature. Fish populations may be seriously reduced by a decreased oxygen supply.

Suspended sediment is a significant aquatic habitat quality problem in Middle Creek. The effect of high sediment concentrations is similar to lowering dissolved oxygen; both species diversity and total fish populations decrease. The percentage of sport fish often decreases while the percentage of rough fish increases.

Improved terrestrial wildlife habitat with more vegetative diversity is needed throughout the watershed. In some instances, livestock owners do not have good grazing programs because too little of their land is in native (warm season) grass. Habitat diversity and quality is thus retarded.

Livestock have access to grassland year long in most operations. Even when cropland is the primary source of forage, livestock are watered in adjacent grassland. Coincident overgrazing of grassland reduces vigor of desirable, naturally occurring plants. As these desirable plants weaken, weeds increase. The result is less production, increased erosion, soil compaction, and increased surface runoff. Six hundred acres of grassland are producing excessive runoff that aggravates 95 acres of active gullies.

About 25 percent of the forest land is moderately to heavily grazed. This compacts the soil, destroys humus and litter, increases erosion and runoff, and impairs reproduction of desirable trees.

Uncontrolled fire and unwise burning destroys grass and tree cover needed for watershed protection. Fire also lowers the quality and growth rate of commercial timber.

Most forest land has not received any management in the past. Results include poor quality, low value trees, and

little economic return. Many forest sites have good growth potential and some are adequately stocked. Good management is needed, however, to produce good quality commercial timber.

Economic and Social

Over 12 percent of the watershed families are classed as low income. Median family income in both counties (Linn, $6,792; Miami, $8,348) is below the state median ($8,693). Almost 21 percent and 13 percent respectively of the families in Linn and Miami Counties are low income units. This compares with 10.6 percent of all families in Kansas that have low income. Figures are from 1970 census.

Employment opportunities in the watershed are limited. Farming is almost the only source of employment. The number of farms has been decreasing with a corresponding increase in farm size and the number of farmers seeking second jobs.

Primary industry has not located in the area because labor force, transportation, and water supply are limited. As transportation facilities to Kansas City improve, employment in the metropolitan area and residence in the watershed will be more attractive.

Other

Nine major log jams now choke the main channel of Middle Creek. The number and location of log jams varies from time to time. Debris accumulation of this type is a continuing problem. Log jams trap sediment and otherwise physically reduce channel capacity and increase the frequency of flooding. They also increase the chance of damage to bridges during floods (see Appendix E).

RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

No specific land use plan exists for the watershed. The watershed is in the Lake Region Resource Conservation and Development project area. The Lake Region RC&D Council and Regional Planning Commission plan and foster measures to improve, develop, and utilize human and natural resources of the area.

This proposed action does not conflict with any known or planned controls or objectives. It harmonizes with the

general policy of all concerned to encourage conservation and wise use of all resources. Refer to the "Short-Term vs. Long-Term Use of Resources" section for more discussion on this topic.

ENVIRONMENTAL IMPACT

Conservation Land Treatment

The on-going land treatment program will result in more efficient use of land and water resources and increased farm income. Accelerated land treatment will increase this impact on 1,700 acres of cropland, 1,910 acres of grassland, and 536 acres of forest land. Land treatment impacts are described for total land treatment unless otherwise noted.

Effects of land treatment will be: 12 percent reduction in average annual flood damages, reduced erosion, improved soil tilth, increased moisture intake by the soil, and increased crop and livestock production. Soil loss by erosion will be reduced from 117,000 to 105,000 tons annually.

The amount and rate of surface runoff will be reduced. Loss of dissolved, particulate, and absorbed chemicals will be retarded by land treatment measures allowing increased on-site decomposition and plant consumption. Average chemical concentrations in runoff will change very little but slug effects and total flood flow chemical yields will be reduced. Average chemical concentrations in base flows will change very little although base flows will be prolonged.

Average annual suspended sediment concentrations now vary from 1,100 to 1,400 mg/l (milligrams per liter) in Middle Creek. Land treatment will reduce these concentrations by 9 to 14 percent along the stream.

The forest land treatment program will make woodlands more beneficial to wildlife and more effective for reducing erosion. Woodlands with vigorous, fully stocked stands of trees and undisturbed ground cover will improve water intake by soils. Proper woodland management and wise use of forest sites will increase economic returns. Windbreak and shelterbelt plantings will break up wind and assist in reducing erosion.

Land treatment measures, including detention dams, will change the use of about 0.7 percent of the watershed upland. About 70 acres will go from cropland to grassed waterways

while 110 acres go from grass to miscellaneous (primarily farm ponds). The four detention dams will require 32 acres of cropland, 37 acres of grassland, and 45 acres of woodland. Dams and spillways will occupy 13 acres; sediment pools, 36 acres; and flood water detention pools, 65 acres. They will all be on ephemeral streams.

Land treatment measures will increase habitat diversity and improve woodlands. Crop residue management leaves more food for wildlife during critical winter periods. Planned grazing systems will provide improved quality and quantity of herbaceous vegetation.

About half of the land treatment impacts will be due to the on-going land treatment effort and half to acclerated land treatment as a project measure.

Structural Measures

Planned structures will reduce depth, extent, and frequency of flooding; sediment load; and velocity of flood flows. Figure 7 shows peak discharges with and without the project for various frequencies and channel capacities for evaluated reaches (see Project Map, Appendix H, for reach locations).

Figure 7

PEAK DISCHARGES AT REACH OUTLETS

REACH NO:	I	II	III	IV	V	VI
DRAINAGE AREA AT REACH OUTLET, SQ MI:	69.8	60.2	47.8	39.3	29.6	19.0
CHANNEL CAPACITY, CFS:	400	800	900	a/	a/	a/
PEAK DISCHARGES, CFS :						
500 year frequency						
without project	23,800	27,000	26,000	25,900	24,100	18,700
with project	11,000	14,000	9,300	9,000	8,400	6,700
100 year frequency						
without project	15,300	17,300	16,800	17,000	15,500	12,800
with project	7,050	7,900	6,000	6,100	5,500	4,800
50 year frequency						
without project	12,800	14,200	13,800	14,200	13,000	10,600
with project	5,800	6,150	4,900	5,050	4,500	3,650
10 year frequency						
without project	7,600	8,500	8,300	8,900	8,100	6,400
with project	3,450	3,400	2,950	3,150	2,800	2,100
1 year frequency						
without project	1,610	1,800	1,950	2,150	1,850	1,400
with project	770	860	840	800	620	400

a/ Not evaluated

Runoff from 29.8 square miles (43 percent of the watershed) will be controlled by floodwater retarding structures. Average peak flood discharge will be reduced by 54 percent at the watershed outlet.

The planned project will accomplish a 63 percent reduction in average annual flood damage over the flood plain. The area affected and the percentage of damage reduction for each reach is shown in Figure 8.

Total damage reduction benefits of $297,500 consist of 75 percent floodwater (including crop and pasture, other agricultural, and road and bridge), 15 percent flood plain scour, and 10 percent indirect damage reduction.

Figure 8

Flood Damage Reduction

Reach No.	Area Affected (acres)	Damage Reduction (percent)
I	2,189	59
II	1,325	66
III	679	70
IV	115	70
V	117	70
VI	76	76
Total	4,501	63

Discharges from principal spillways will prolong in-channel flows following runoff producing storms. Stream banks will erode downstream from dams until equilibrium is re-established. Degradation will be minor because most channels are eroded to bedrock.

Reduction in depth and frequency of flooding will substantially improve crop production. Damage from a flood similar to the September 4, 1961, flood will be reduced from $662,700 to $426,000.

Average frequency of flooding, now one to three times per year, will be reduced to once each one to two years along the stream. The area flooded annually will be reduced from 5,796 to 2,320 acres.

Flood plain scour will be reduced so that productivity will increase on 1,225 acres. Reduction in flooding will facilitate return to normal production on previously damaged land.

Five hundred sixty-nine acres now covered by the 2-year frequency flood will flood less often and be classified as prime farm land. Three hundred forty-two acres of prime land will be used for structure sites, however. This leaves a net increase of 227 acres. One thousand four hundred fifty acres of existing prime farm land will benefit through reduced flooding.

Cost of maintaining roads and bridges on the flood plain will be reduced 68 percent. Passage of goods through the watershed will be more efficient and dependable.

Floodwater storage by Multipurpose Structure No. 1 will reduce costs of U.S. Highway 69 improvements planned by the Kansas Department of Transportation. Coordination of construction of the two projects will further reduce construction costs of each. Part of the highway to be replaced will be covered with water, but much will be used for access to the reservoir and recreational facilities.

Sediment pools of the 7 floodwater retarding structures will create 250 acres of additional surface water on private land. These pools will average 36 surface acres and range from 22 to 50 acres. An additional 453 acres in the flood detention pools will be inundated occasionally. The sediment pools will provide a source of water for fishing and for livestock.

Storm runoff will increase concentrations of nutrients, biocides, and microorganisms in reservoirs. Most of these materials will settle within one week. Planktonic blooms will sometimes occur between storm inflows.

Impoundment of sediments, other solids, and absorbed chemicals will reduce these potential pollutants in downstream waters. The effect of storm flow slug concentrations of nutrients, bacteria, sediment, and suspended solids will be reduced. Alkalinity, biological oxygen demand, and hardness will be decreased. Stream temperatures will not be significantly changed. Total aquatic life will increase.

Uncompensated losses of terrestrial habitat will be approximately 164 H.U. of woodland and 53 H.U. of odd area habitat. A net gain of 304 H.U. of herbaceous habitat will occur.

Hunting opportunities will increase slightly. Pond fishing opportunities will increase but stream fishing is not expected to change.

Removal of log jams in Middle Creek will decrease the frequency of flooding and reduce sediment deposition in the channel.

Some soil erosion and air and water pollution will occur during construction.

Structural measures will occupy land now devoted to other uses as shown in Figure 9:

Figure 9

Land Use at Structure Sites

	Present Land Use (Acres)				
	Crop-land	Grass-land	Wood-land	Other	Total
Sediment & Beneficial Use Pools	164	138	225	4	531
Detention Pools	229	247	55	1	532
Dams and Spillways	21	29	29	-	79
Recreation Land	83	94	59	-	236
Total	497	508	368	5	1,378

This land use change involves about 3 percent of the watershed area. About 9.6 miles of intermittent stream will be permanently flooded and approximately 8 more miles will be flooded occasionally by detained floodwater.

Flood plain land management should improve with less flooding.

Multipurpose Structure No. 1 will provide a 281 acre pool for water-based recreation and 344 acres of surrounding land for public use including 29 acres for dam and spillway, 79 acres for floodwater pool, plus 236 acres for recreation.

Recreational facilities at Multipurpose Structure No. 1 will accommodate 50,000 annual recreational visits. The period April 15 through September 15 is the primary season of use. Approximately 42,500 recreational visits will be during this season with 7,500 recreational visits during the remainder of the year. Planned facilities will accommodate 664 recreational visits on a maximum use (weekend) day. Anticipated activities of users are: 70 percent fishing, 20 percent picnicking, 10 percent camping, and 10 percent hunting. (Percentages exceed 100 because there is overlapping of some activities--i.e. some picnickers will also hunt and fish.)

Three thousand acre feet of water will be stored in the multipurpose reservoir. This volume will provide 0.97 m.g.d. (million gallons per day) with a 98 percent certainty. There will be 281 surface acres for recreation approximately 80 percent of the time. The water will be of adequate quality to meet state requirements for intended use.

Economic and Social

Transporting, processing, and marketing of agricultural commodities will be more dependable. Increased farm income will increase the net return to local retailers. More goods and services will be consumed on farms to obtain expected benefits through increased production potential. Prolonged reservoir releases will inconvenience operators who use low water crossings as field or pasture access.

Installation of the project will provide 68.6 man years of new employment during the 7-year installation period. Operation and maintenance of the structures and the recreation and water supply facilities will provide 0.7 man years of employment annually. Net annual employment increases of 6.9, 3.9 and 5.0 man years are anticipated through increased agricultural production, recreational development, and indirect activity, respectively.

Traffic, litter, and noise around the recreational facilities will increase. The recreational development will provide open space for public use as well as providing fish and wildlife habitat.

Relocations are not expected to significantly affect the social, economic, or environmental elements of the watershed. Two farm operations involving 5 persons will be eligible for relocation assistance because of land acquisition at the multipurpose site. No dwellings are affected and no minorities are involved. Individuals eligible for relocation may experience indecision, anxiety, or disappointment over their available options.

The reduction in flood hazard will induce farmers to use more fertilizer, improved crop varieties, and establish soil building rotations. Farm work can be better timed for more efficiency.

Flood plain residents, estimated at 12 people, will have improved living conditions and economic and psychological security from reduced flooding. All or parts of 46 farms located in the flood plain will be directly affected. An additional 450 watershed residents will benefit indirectly.

Rural area development will be advanced through increased farm incomes, higher land values, decreased flood expenses, and a more stable economy. Impacts on minority groups will be about the same as on the total population.

A false sense of security and unwise flood plain development may result from increased levels of flood protection. More intensive use, particularly in low lying areas, will increase danger and potential damage from large floods.

Although only one archeological site has been found at proposed structure locations, there is possibility of other discoveries during project construction. Despite required precautions, there is potential danger of their destruction.

Favorable Environmental Impact

Adequate management and protection of 1,700 acres of cropland, 1,910 acres of rangeland, and 536 acres of forest land will be provided. This is in addition to that which would be treated during the same period under the going program.

Average soil loss will be reduced by 12,000 tons per year, a 10 percent reduction. Less sediment will be deposited in fields, channels, road ditches, and farm ponds. Average annual sediment yield to the Marais des Cygnes River will be reduced 11 percent.

Average annual flood damages will be reduced 63 percent on flood plain land. Benefits will accrue to crops, pastures, other agricultural property, roads and bridges. Flood plain scour and indirect damages will decrease. A net increase of 227 acres of prime farm land will occur.

Water stored in the multipurpose reservoir will total 3,000 acre feet and yield 0.97 million gallons per day. A total of 625 acres, including a 281-acre lake, will be provided for public recreation and open space. Fifty thousand annual recreation visits, including 35,000 visits for fishing and 5,000 visits for hunting, are anticipated.

Sediment pools of floodwater retarding dams will provide some livestock water and flow stabilization for the creeks on which they are located. They will increase landscape diversity and habitat for fish and other water oriented wildlife. Two-hundred fifty acres of potential warm-water fishing will thus be created on private lands.

Rural area development will be enhanced. Project installation will provide 68.6 man years of new employment. A permanent employment increase of 16.5 jobs is expected due to the project.

Adverse Environmental Impacts

Construction of land treatment measures will temporarily disrupt vegetation on about 0.7 percent of the watershed upland. Current uses of 531 acres at floodwater retarding dams and 36 acres at detention dams will be lost . These 567 acres will be used for sediment and water supply pools. Periodic filling of floodwater retarding pools will occasionally disrupt use of 531 additional acres at floodwater retarding dams and 65 additional acres at detention dams.

Agricultural uses will be lost on dams and spillways. Wildlife uses of these areas will be temporarily interrupted until vegetation is reestablished.

Loss of agricultural use will occur on 236 acres of land devoted to public recreation and wildlife habitat. Reservoirs will cover 9.6 miles of intermittent stream.

Traffic, litter, and noise around the multipurpose site will increase.

Two farm operations involving five persons will have to relocate or accept a reduced size of their farm operations.

Construction activities will increase risk of damage to hidden archeological values at structure sites.

ALTERNATIVES

Seven alternatives to the planned project are discussed. Costs and major impacts of each are summarized here. Additional information is contained in Appendix B, Summary Comparison of Alternative Plans.

Alternative number 1 is to take no action. The existing conservation land treatment program would continue. An estimated 7,109 acres would be treated. There would be no project costs.

Effects would include a 6 percent reduction in soil erosion; and flood damages would eventually be reduced by 8 percent.

Annual net benefits foregone would be $231,900. Floods would continue to cause extensive damage. Log jams would continue to trap sediment and impede flow in Middle Creek. Water supply and recreation needs would not be met.

Alternative number 2 consists of supplementing the existing conservation land treatment program with an accelerated program. This would increase the treated area by approximately 4,146 acres. Total cost of the accelerated program would be $497,700.

Flood damages would be reduced by 4 percent and erosion would decrease 4 percent compared to the ongoing condition.

Flood losses would remain high. Water supply and recreation needs would not be met.

Alternative number 3 (the National Economic Development Plan) includes accelerated land treatment, log jam removal, one multipurpose floodwater retarding, water supply and recreation structure and seven single purpose floodwater retarding structures. Recreational facilities and areas for recreation and wildlife would also be included. Total cost would be $4,663,200.

Flood damages would be reduced by 63 percent. Erosion would be reduced by 10 percent. Sediment delivery would be reduced by 29,800 tons per year to the Marais des Cygnes River; and by 36,000 tons per year to Middle Creek. Fifty thousand potential annual recreational visits would be provided and 3,000 acre feet of water would be stored for municipal, industrial, agricultural, and recreational use. Yield for beneficial consumptive use would be 0.97 million gallons per day.

Four hundred ninety seven acres of cropland, 508 acres of grassland, 368 acres of forest land, and 9.6 miles of intermittent stream would be occupied by this alternative.

Alternative number 4 (the Environmental Quality Plan) includes a concentrated (100 percent of needs) accelerated conservation land treatment program; one multipurpose structure for flood control and recreation, including recreational facilities and areas for public use and wildlife; a fish management program for Middle Creek; easements on 440 acres to preserve and manage riparian habitat; a comprehensive land use plan; and removal of log jams from Middle Creek. Total cost is estimated at $2,580,600.

Effects include a 23 percent reduction in flood damages; a 17 percent reduction in erosion; creation of open space and water-based recreation for 58,000 visits annually; improved hunting and fishing; and regulation of flood plain development. Sediment delivery would be reduced by 17,400

tons per year to the Marais des Cygnes River; and by 21,000 tons per year to Middle Creek.

Two hundred seventy acres of cropland, 211 acres of grassland, 302 acres of woodland, and 4.2 miles of intermittent stream would be occupied by this alternative. Floods would continue to cause much damage and water supply would still be a problem.

Alternative number 5 consists of accelerated land treatment and one multipurpose structure for flood control and recreation, with the addition of municipal, industrial, and agricultural water supply. Recreational facilities and areas for recreation and wildlife would also be included. Total cost would be $2,413,300.

Flood damages would be reduced by 15 percent. Facilities for 50,000 annual recreational visits would be provided, and 3,000 acre feet of water would be stored for municipal, industrial, agricultural, and recreational use. Water yield would be 0.97 million gallons per day. Erosion would be reduced by 10 percent. Sediment delivery would be reduced by 14,800 tons per year to the Marais des Cygnes River; and 17,900 tons per year to Middle Creek.

Two hundred seventy acres of cropland, 211 acres of grassland, 302 acres of woodland, and 4.2 miles of intermittent stream would be occupied by this alternative. Log jams would continue to impede flow and trap sediment in Middle Creek and significant flood damage would still occur.

Alternative number 6 consists of accelerated land treatment and one multipurpose structure for flood control and recreation, with the addition of municipal, industrial, and agricultural water supply. Recreational facilities and areas for recreation and wildlife would also be included. It would also include an excavated auxiliary flood flow channel to help carry excess floodwater from the watershed. The channel would be wide and shallow (averaging 4 feet deep and 45 feet wide) and would extend from near New Lancaster to the Marais des Cygnes River. It would follow the existing creek at some places and go along flood plain scour channels in others. Total cost would be $3,148,100.

Flood damages would be reduced by 45 percent. Erosion would decrease by 10 percent; sediment delivery would be reduced by 16,400 tons per year to the Marais des Cygnes River and by 20,000 tons per year to Middle Creek; 50,000 potential recreational visits would be created annually; and

3,000 acre feet of water would be stored for municipal, industrial, agricultural, and recreational use. Water yield would be 0.97 million gallons per day.

Three hundred fifty-one acres of cropland, 236 acres of grassland, 360 acres of woodland, and 4.2 miles of intermittent stream would be occupied by this alternative. Six additional miles of stream would suffer partial loss of riparian vegetation. Log jams would remain but their harmful effects would be diminished by the auxiliary channel.

Alternative number 7 includes accelerated land treatment, removal of log jams, a single purpose floodwater retarding dam in place of the multipurpose structure, and seven additional floodwater retarding dams on watershed tributaries. Cost of this alternative would be $3,361,700.

Flood damages would be reduced by 63 percent. Erosion would be decreased by 10 percent. Sediment delivery would be reduced by 29,800 tons per year to the Marais des Cygnes River, and by 36,000 tons per year to Middle Creek.

Two hundred eighty-nine acres of cropland, 300 acres of grassland, 213 acres of woodland, and 8 miles of intermittent stream would be required for this alternative. No recreational or water supply benefits would be realized from this alternative.

SHORT-TERM VS. LONG-TERM USE OF RESOURCES

Project construction will cause a short-term increase of energy consumption and localized reductions in plant and animal resources. Potential long-term use of land will be limited at dam and reservoir sites although it will be physically possible to convert them to other uses should it ever be necessary or desirable.

Conservation land treatment, recreational facilities, floodwater retarding structures and fish and wildlife habitat measures, if properly maintained, will continue to provide benefits beyond the 100-year life of this project. Structures will reduce flooding and trap sediment beyond their design life, although this ability will decrease as reservoirs fill with sediment.

Middle Creek is in the Marais des Cygnes portion of the Lower Missouri Subbasin of the Missouri River Basin. Watershed construction in the Kansas portion of the subbasin

includes 4 structures in Switzler Creek (a pilot watershed), and 8 structures in Frog Creek (a completed P.L. 566 project). Together, the two projects comprise 66 square miles, 39 percent of which are controlled by the 12 structures. Switzler Creek Watershed has applied for P.L. 566 assistance for additional flood protection. Tauy Creek and Upper and Lower Pottawatomie Creek Watersheds have also applied for assistance in planning and installing P.L. 566 projects. These four applications cover 649 square miles, or approximately 20 percent of the Kansas portion of the subbasin. Effects of these projects conform with objectives of the Missouri River Basin Framework Plan. The anticipated projects are similar but not interrelated; that is, success of one does not depend on completion of another.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Agricultural use and terrestrial wildlife habitat will be lost on 531 acres to be inundated by sediment and beneficial use pools. An additional 532 acres in the floodwater retarding areas of the reservoir structures will be periodically flooded. Reduction of agricultural use and terrestrial wildlife habitat in these areas will occur. The 79 acres to be used for dams and spillways will be lost for terrestrial wildlife use until revegetation is accomplished. Reservoirs will inundate 9.6 miles of intermittent stream.

Construction of the planned structures will require 68.6 man years of new employment. Operation and maintenance of the structures and recreational and water supply facilities will require 0.7 man years of employment annually. Total project installation cost will be $4,663,200.

CONSULTATION AND REVIEW WITH APPROPRIATE AGENCIES AND OTHERS

In 1960 residents of Middle Creek Watershed began holding informal meetings directed toward organization of a watershed district. Middle Creek Watershed Joint District No. 50 was issued a certificate of incorporation on October 17, 1961.

Application for assistance under P.L. 566 was filed in 1962 with the Kansas Watershed Review Committee. The application was sponsored by Linn and Miami County Conservation Districts and the Middle Creek Watershed District.

The Kansas Watershed Review Committee's field examination team examined the watershed after a public notice of intent

and invitation for public attendance. The examination consisted of a tour of the watershed followed by a meeting with the sponsors and other community leaders. The Kansas Watershed Review Committee, the Soil Conservation Service, the watershed district, the conservation districts, and interested individuals were represented in the field examination. The examination showed that a watershed treatment and flood prevention program with development of water supply for municipal, industrial, agricultural, and recreational use was needed.

The application for assistance in planning and carrying out works of improvement under P.L. 566 was approved by the Watershed Review Committee. The application was then filed with the Soil Conservation Service. In August 1966 the Watershed Review Committee recommended Middle Creek Watershed for planning and assigned priority number 46.

Pursuant to the application for assistance, representatives of the Watershed Planning Staff from the Soil Conservation Service, Salina, Kansas, made a reconnaissance of the watershed. These representatives included planning specialists in hydrology, geology, engineering, and economics. A preliminary investigation report was subsequently prepared for the sponsors. Sponsors agreed to proceed with planning based on this information. News items in local newspapers informed the public of preliminary project objectives and the probable scope of planned works of improvement.

A request to the Administrator of the Soil Conservation Service for authorization to provide planning assistance to Middle Creek Watershed was made on December 23, 1966. Authorization was granted on April 10, 1967, under the authority of the Watershed Protection and Flood Prevention Act (P.L. 566).

On December 14, 1967, the Soil Conservation Service Watershed Planning Staff met with sponsors to prepare the watershed district board of directors for their responsibilities in formulating a project. Presentations were given by each staff specialist to acquaint district board members with procedures used in developing planning data. Average annual flood damages and potential benefits of flood protection were presented with visual aids. Procedures for developing structure designs and cost estimates were explained. As in earlier meetings, information useful to district board members in selecting structure sites was discussed.

On December 15, 1967, the watershed district board formulated a program of flood control and land treatment measures. The board further decided to expand project measures to include water supply for municipal, agricultural, industrial, and public recreational uses. The Kansas Water Resources Board and the Kansas Forestry, Fish and Game Commission joined in sponsoring the multipurpose development.

Work progressed until a preliminary draft watershed plan was completed in February, 1971. A reduction in Soil Conservation Service planning forces and funds slowed progress at this point.

Other factors also combined to further delay the project. A new planning procedure was adopted by the Water Resources Council. "Phase-in" procedures intended to ease the conversion to the new planning system were adopted but manpower was not available to convert the plan to meet the deadlines. Consequently it was shelved to meet deadlines for other projects with high priority in the planning process.

The National Environmental Policy Act and subsequent regulations required additional environmental assessment before further progress could be made.

Reformulation of the project was begun in 1974. A public meeting was held August 15, 1974. The project and its status were discussed and information and ideas were solicited from the public. Questionnaires were distributed requesting input from interested persons, groups, and agencies.

Interdisciplinary teams assisted sponsors with formulation of alternative plans, including an environmental quality (EQ) plan and a national economic development (NED) plan. Agencies represented on the environmental quality planning team included Kansas Office of State and Extension Forester; Kansas Forestry, Fish and Game Commission; Kansas Water Resources Board; Environmental Protection Agency; and the Soil Conservation Service. The EQ plan was discussed with the watershed district board on February 24, 1975.

The environmental assessment was made with input from the sponsors, all the aforementioned agencies, and others. An environmental assessment report was completed in July, 1975 by an environmental consultant.

The NED plan was prepared by a multidisciplinary Soil Conservation Service team.

On July 7, 1975, a public meeting was held. The environmental assessment report was presented and discussed; and the EQ and NED plan components along with other alternatives were presented and discussed.

On August 4, 1975, project sponsors and Soil Conservation Service representatives met and the sponsors made their selection of the plan as proposed in this document.

Meetings and consultations continue as the sponors, Soil Conservation Service, the Kansas Department of Transportation and other interested parties work out details of coordination and cooperation anticipated in design, construction, operation and maintenance of the planned works of improvement.

Since submitting its application for assistance under P.L. 566, the watershed district board has carried out a continuing informational exchange program with the general public. Some activities of this program are:

1. Regular quarterly meetings open to the public have been held. Specialists have usually been available to discuss specific problems.

2. Annual meetings, advertised in advance in the principal county newspapers, have been conducted.

3. There were several meetings between watershed board representatives and officials of townships, state and county highway departments, and the other sponsors.

4. Frequent person-to-person contacts have been made between watershed directors and individual farmers to explain the program and encourage the application of land treatment measures. Most of the farmers within the watershed have been contacted.

5. Public tours to other watersheds have been sponsored by the district board.

6. Public informational meetings have been conducted, and a public hearing on the general plan (a requirement of Kansas law) was held.

The sponsoring conservation districts are in full support of the proposed watershed program. News media, business people, and others are giving substantial backing to the project. There has been considerable opportunity

for residents and landowners in the watershed to participate in formulating the project objectives.

During project formulation, the U.S. Fish and Wildlife Service, cooperating with the Kansas Forestry, Fish and Game Commission and the Soil Conservation Service, completed a detailed study of the proposed project area. Mitigation measures recommended in the Fish and Wildlife Service's report4/ were incorporated during project planning.

A forestry work plan2/ was developed by the State and Extension Forester and the Forest Service. The forestry work plan was used to develop forestry aspects of the watershed plan.

The Kansas State Archeologist and the State Historic Preservation Officer were consulted to determine historical and archeological resources in the watershed and the impact of the proposed project on these resources. The resulting investigations have been completed. No further surveys are recommended or planned, and no significant project impacts are anticipated.

A public meeting was held March 21, 1977, at New Lancaster, Kansas, to discuss the preliminary draft plan and environmental impact statement. Attendance of the meeting included representatives of Middle Creek Watershed Joint District No. 50, Miami County Conservation District, Kansas Forestry, Fish and Game Commission, Kansas Water Resources Board, Pottawatomie Creek Watershed, Soil Conservation Service, and landowners in the watershed. Sections reviewed included the Planned Project, Operation and Maintenance, Project Benefits, Environmental Setting, Water and Related Land Resource Problems, Environmental Impacts, and Alternatives. A question and answer session was a part of the meeting. Questions dealt with water supply, the time element, federal funding, and recreational needs.

Throughout the planning effort the Kansas Water Resources Board sought federal assistance through the Farmers Home Administration for a watershed loan and advance to finance its share of the cost of Multipurpose Structure No. 1. It also sought state appropriations for that purpose. The Kansas Water Resources Board was not able to arrange such financing, however, and on July 14, 1977, withdrew in favor of the City of Louisburg and Miami County Rural Water District No. 2; each of which has now applied for a loan and advance through the Farmers Home Administration.

The following agencies, conservation groups, and organizations were asked to comment on the draft environmental impact statement:

Department of the Army*
Department of the Interior*
Department of Commerce
Department of Health, Education, and Welfare*
Department of Transportation
Office of Equal Opportunity, USDA*
Forest Service, USDA
Environmental Protection Agency*
Federal Power Commission
Governor of Kansas*
Division of State Planning and Research, Department of Administration, State of Kansas (Clearinghouse)
Natural Resources Defense Council
Friends of the Earth
Environmental Defense Fund
National Wildlife Federation
National Audubon Society
Environmental Impact Assessment Project
State Historic Preservation Officer

*Replies were received from these. See Appendix C for letters of comments received.

Disposition of Comments

Each environmental issue, problem, or objection raised during the formal interagency review of the draft watershed plan and environmental impact statement are presented and discussed.

Department of the Interior (letter dated June 28, 1977)

Comment:

In accordance with subsection (2) of Section 12 of Public Law 566, we request that the report of the Fish and Wildlife Service on the Middle Creek Watershed Project become an attachment to this report when it is transmitted to the Congress.

Disposition:

We will ask our Washington Office to attach the report to the document for the transmittal according to our usual procedure.

Comment:

Land, Pages P-12, E-1, E-30

We have problems with the relatively recent position of the Kansas office of the Soil Conservation Service regarding downstream flood plain clearing by private landowners as a result of installation of P.L. 566 structures on upstream drainages. The innate susceptibility of particular stands of bottomland timber to frequent, natural flooding is a definite economic deterrent - sometimes the only deterrent - to their clearing by landowners for conversion to agricultural land. When the installation of P.L. 566 or other water retarding structures removes flooding as a serious consideration, that disincentive is removed.

In recent responses to Fish and Wildlife Service Kansas City field office's comments on draft environmental impact statements, the SCS has maintained the view that natural flooding is not a deterrent to timber clearing and conversion of the land to agricultural use. This is an abrupt departure from former policy, in effect at least as recently as six years ago, that such clearing for agricultural use was considered a project benefit in nearly all Kansas watershed plans forwarded to Congress. The possibility of project induced flood plain timber clearing for agricultural purposes is real and should be fully addressed in the environmental statement especially as it relates to impacts on wildlife habitat and wildlife populations.

Disposition:

We find no reference to timber clearing on pages P-12, E-1, or E-30. Page E-15 (first paragraph) discusses timber clearing. Paragraph 2 on page E-17 describes physical characteristics of existing woodland, the next paragraph of page E-17 describes existing market for timber products. Paragraph 1 on page E-28 describes timber clearing since 1965 as a problem affecting water quality and aquatic life.

Recent trends of timber clearing, and the size, shape, and location of existing timber, indicate that some clearing will continue in this watershed regardless of watershed project activity. Possibly the only effective deterrent to timber clearing in Middle Creek Watershed is the impossibility of using modern farm machinery on small irregular tracts of existing timber. Because timber clearing will occur in the future without the project, it is not discussed as a project impact.

The assessment of present conditions and projection of future conditions with and without project in Middle Creek are consistent with SCS policy, past and present; not an "abrupt departure." Conditions vary with time and from one watershed to another. We try to evaluate each project as accurately and completely as our resources allow.

Comment:

Water Resources, Page E-3, E-6, App. G, Tables G-1, 2

Water quality in the lake behind the proposed multi-purpose dam should be further discussed, particularly with respect to potential algae blooms. Water analyses for the watershed indicate that phosphate and nitrate concentrations may be sufficiently high to produce blooms in a shallow lake.

Disposition:

We find no reference to water quality on E-3 or E-6. We have rewritten paragraph 3 on page E-34, however, to better address the subject. Pages P-9 and E-12 also discuss water quality and state that the Kansas Forestry, Fish and Game Commission will maintain lake water quality to meet requirements for intended uses.

Comment:

The statement should address effects on ground water levels of the prolonged impoundment of water in the multi-purpose reservoir.

Disposition:

Geologic investigations indicate that seepage losses from all the planned reservoirs will be quite low and that effects on ground water levels will be both insignificant and highly localized. We try to avoid listing things in the environmental impact statement that will not be affected by the project.

Comment:

Cultural Resources, Pages P-7, E-3, E-20

The Soil Conservation Service, in coordination with the State Historic Preservation Officer, should first complete any cultural surveys that may be necessary to identify properties eligible for the National Register in the area of project impact.

Disposition:

The State Historical Society in consultation with the State Historic Preservation Officer has completed the necessary investigations. No further surveys are recommended or planned and no significant project impacts are anticipated. Pages E-20 and E-46 have been revised to report these findings.

Comment:

The statement indicates that responsibility for mitigating adverse effects on cultural resources lies with the Secretary of the Interior. We cannot agree with Soil Conservation Service's position regarding this interpretation of the Archeological and Historic Preservation Act of 1974, Public Law 93-291. This responsibility for developing mitigating measures rests with the Federal agency taking the action.

The application of Public Law 93-291 is appropriate only after all planning steps mandated by the National Environmental Policy Act of 1969, the National Historic Preservation Act of 1966, and Executive Order 11593 are completed; thus, the Act augments but does not substitute for this legislation. The requirements of the Acts and Executive Order are specified in the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

The results of the Soil Conservation Service's implementation of the Council's "Procedures," along with the State Historic Preservation Officer's comments and any other pertinent documentation, should be included in the final statement.

There are additional areas where adjustments or clarification might be helpful.

Disposition:

We have removed the paragraph on archeological or historical materials from page P-7. We have expanded the paragraph on page E-10 to clarify Soil Conservation Service responsibilities. Page E-46 documents consultation with the State Historic Preservation Officer. We now make no reference to responsibility of the Secretary of the Interior.

Comment:

Page E-15, Paragraph 1--We question whether 100 percent of the flood plain land (1,495 acres plus 3,006 acres =

4,501 acres) should be considered prime agricultural land even if there were no flooding. The miscellaneous category of flood plain land usually includes streambed, streambank, and other relatively nonusable areas. Further, paragraph 2 on page E-3 states that 587 acres now frequently flooded will be reclassified as prime agricultural land.

Disposition:

Streambank and streambed areas were not included in the 4,501 acres. Other miscellaneous areas, however, were erroneously called prime farm land. This includes roads and small tracts of unfarmable land estimated at 3 percent of the flood plain. The figures have been corrected accordingly.

Comment:

Page E-38, Alternatives--We believe the differences in the following figures should be explained or reconciled.

	Page E-38	Page P-19
Ongoing Treatment-Alternate 1	$ 875,700	$ 877,200
Accelerated Treatment-Alternate 2	$ 495,000	$ 497,700
Project Costs-Alternate 3	$4,267,500	$4,270,500

Disposition:

The costs shown on page E-38 were wrong. They have been corrected to be consistent with Table 1.

Comment:

It appears the ongoing program is a part of each alternative. If this is correct, it would seem the ongoing treatment cost of $875,700 (or $877,200) should be included in the cost of each alternate to show a comparable cost analysis.

Disposition:

The ongoing land treatment program is not a part of the planned project or of any alternative. It would continue without the project. Hence, it is inappropriate to include its cost in the alternatives. We are correcting the description of Alternative No. 1 to say that it involves no project costs.

Comment:

Page E-41, Last Full Paragraph--It is noted that the ongoing treatment cost of $877,200 has not been included in consideration of irretrievable commitment of resources.

Disposition:

This is related to the previous comment. Because the ongoing land treatment is not part of the planned project, this commitment of resources is not a project cost.

Department of Health, Education, and Welfare, Public Health Service (letter dated June 13, 1977)

Comment:

We note . . . that potential mosquito breeding conditions associated with the multipurpose reservoir have been omitted from the EIS. Even though large human population centers are not located near the reservoir, recreational usage will amount to 50,000 man-days which will occur mainly during the mosquito season. We believe, therefore, that mosquito control provisions should be included in the EIS.

Disposition:

We have added a statement in the Operation and Maintenance Section to indicate vectors will be controlled through methods recommended by the Kansas Department of Health and Environment.

Office of Equal Opportunity, USDA (letter dated April 27, 1977)

Comment:

In accordance with Soil Conservation Service Guidelines for preparing environmental impact statements (Federal Register, Vol. No. 39, No. 107, June 3, 1974), it is recommended that in your final draft you include an assessment of the social and economic impacts of the plan on the minority population.

Disposition:

We have added a statement to the Impacts Section addressing this topic as you suggest.

Forest Service, USDA (letter dated June 1, 1977)

Comment:

1. Page-5, last paragraph, third sentence--change to read, "The SCS and the Kansas State and Extension Forester in cooperation with the U. S. Forest Service will provide technical assistance."

Disposition:

We have made the change as requested.

Comment:

2. Page-19, Table 1, Land Treatment--"Fire Control" should be listed under the heading, "Individual Practices such as."

Disposition:

Table 1 has been so revised.

Comment:

3. Page E-6, second paragraph, first sentence--change to read, "Forestry technical assistance will be provided by the Kansas State and Extension Forester in cooperation with the U. S. Forest Service through the P.L.-566 and Cooperative Forest Management Programs to serve forest land needs in the project."

Disposition:

The paragraph has been changed as you suggested.

Comment:

4. Page E-21, last paragraph--We feel that this statement needs to be softened or qualified. The operator or owner of forest land does not necessarily have to be a cooperator before technical assistance can be given for the application of forest land treatment measures. In line two of this sentence, add "agricultural" before "land treatment measures."

Disposition:

We have rewritten the sentence to avoid the incorrect connotation.

Comment:

5. Page E-29, first paragraph--delete first sentence and substitute, "A large portion of the forest land has not received any type of management in the past. As a result, most of the forest land has poor quality and low value trees. Such forest stands give little economic return. However, many forest sites have a good growth potential for valuable commercial tree species. Some of these areas have...etc."

Disposition:

The paragraph has been rewritten to contain the essence of this suggestion.

Comment:

6. Page E-29, Relationship To Land Use Plans, Policies, and Controls--add a sentence or two about the efforts of the Lake Region RC&D area and the Regional Planning Commission both of which deal with land use planning.

Disposition:

We have expanded the section as suggested.

Comment:

7. Appendix F, Definitions of Conservation Treatment Practices--add the following to Appendix F, "Fire Control: This measure applies to the prevention of wildfires in forest land, application of approved fire protection and prevention methods, effective control of going fires, and development of fire prevention educational programs."

Disposition:

We have added this item to Appendix F as shown.

Environmental Protection Agency (letter dated July 1, 1977)

Comment:

The final statement should address the need for a permit pursuant to the requirements of Section 404 of P.L. 92-500. If a permit is required, the final statement should provide an evaluation consistent with the Section 404 (b) guidelines (Federal Register Volume 40, No. 173).

Disposition:

Page P-7 states that construction will start when, among other things, the sponsoring organizations have the necessary construction permits. No Section 404 permits will be required, however. All planned dams will be on streams having average flow of less than 5 c.f.s. This determination is supported by correspondence dated April 15, 1976, June 18, 1976, and March 8, 1977, of Robert K. Griffin, Soil Conservation Service, with Colonel Richard L. Curl and Paul D. Barber, Kansas City District, Corps of Engineers.

Comment:

The need for water supply as a project purpose is supported by projections that present water sources are inadequate to satisfy future needs in eastern Miami County. The statement (page E-27) indicates population projections range up to a 300 percent increase by the year 2020. These projections appear somewhat high since both Linn and Miami Counties had a population loss between 1960 and 1970 of 6.1 percent and 3.2 percent respectively (pages E-12 and E-13). In addition, information developed by the Population Research Laboratory at Kansas State University, as of June 18, 1976, shows the Linn County population decreasing to 6,899 by the year 2000 from the 1970 population of 7,770. Correspondingly, the Miami County population is only expected to increase from the 1970 population of 19,254 to 26,000 by the same year. Neither the information provided on pages E-12 and E-13 of the draft statement nor the research study support the projected 300 percent population increase. If the 300 percent figure was used to determine the 2020 water requirement (1.48 mgd), the source of the projection and the reason for selecting it over more conservative estimates should be provided in the final statement.

Disposition:

We have revised the second paragraph of page E-13, adding information on population in Miami County. The KWRB report 25/ cited on page E-27 projects the 2020 population in the service area of this proposed water source at 18,000. This is based on a modest increase in Miami County population most of which is expected in the northeastern part of the county. The effect will be greatest there because of the influence of Kansas City. This is already evident in Johnson County on the north and is progressing south and west. We note that the KSU figures you cite are for the year 2000,

while KWRB figures are for 2020. Much of the increase is expected in that 20-year period. This excerpt from the summary of the KWRB report deals with population and the need for water:

> "Water users in eastern Miami County have indicated that their present water supply sources are inadequate. The present population in the potential service area for the Middle Creek structure is 5,844. This population can be expected to increase to as much as 18,000 by the year 2020 due to the area's location with respect to the Kansas City Metropolitan Area. This increased population would require around 1,660 acre-feet more water annually than is available from existing supplies. The multiple-purpose Middle Creek Watershed structure would be capable of providing a net yield of 1,050 acre-feet of water annually during a 2 percent drought condition at a cost lower than the estimated $23 per acre-foot benefit for water supply from a single-purpose structure and lower than the estimated $20 per acre-foot benefit which could be realized by purchasing raw water from existing municipal sources. Water requirements in excess of the 1,050 acre-feet of firm yield would have to come from some other source."

Comment:

Page E-27 of the draft document states, "Although surface water quality is generally good, no existing impoundments are large enough for needs of the area." This statement should be expanded to address the Hillsdale Reservoir project currently under construction by the U. S. Army Corps of Engineers. The Hillsdale project includes water supply storage and should be evaluated as a water supply source for the project area.

Disposition:

Page E-27 has been revised as you suggest. Page E-24 has also been revised to provide more information on Hillsdale Reservoir. The following excerpt from the September 1976 Annual Report on the Kansas State Water Plan by KWRB provides additional information on Hillsdale water:

Hillsdale Lake
Big Bull Creek

Lake Storage:

Feature	Elevation (msl)	Usable Storage 1/ (Ac-Ft.)		Two Percent Change Drought Yield (mgd)
Flood Control	917-931	81,000		
Conservation	Below 917	68,000		
Water Supply			53,000	17.38
Water Quality			15,000	4.91
Total		149,000		22.30

1/ Remaining storage after 100 years of sedimentation.

Applicants to Negotiate Purchase of Water Supply Service from State:

Johnson County RWD #7 - 3.9 mgd
Johnson County RWD #5 - 4.1 mgd
City of Wellsville - 2.0 mgd
City of Spring Hill - 0.03 mgd
George Butler Assoc. - 0.35 mgd
City of Edgerton - 1.3 mgd
City of Paola - 2.6 mgd
City of Gardner - 3.3 mgd
Miami County RWD #2 - 0.7 mgd

Comment:

Several items mentioned in the draft statement indicate the proposed project may promote significant land use changes in the protected reach of Middle Creek. For example, page E-15 indicates 3,006 additional acres of the watershed flood plain would be prime farm land except for frequent flooding. In addition, the watershed is subject to continual land clearing efforts (page E-14) and page E-36 indicates the reduction in flood hazard would induce farmers to use more fertilizer, improve crop varieties and enhance rural area development through increased farm income, higher land values, decreased flood expenses, and a more stable economy. This information indicates farming or development are expected to be intensified as a result of the proposed project. However, no comprehensive evaluation of the impacts associated with this change in land use was provided. The project's effects on the downstream environment should be evaluated, including the following:

Potential for increased use of farm related chemicals and the associated impacts.

Potential for increased stream pollution resulting from the clearing of riparian and flood plain vegetation.

The loss of the flood plain environment and the associated biota due to a changed flow regime and land clearing.

Potential for the conversion of protected agricultural land to other more intense uses and the associated impacts.

Disposition:

"Potential for increased use of farm related chemicals and the associated impacts:"

Page E-30 (last paragraph) discusses related changes due to land treatment features of the project. Page E-33 (fourth and fifth paragraphs) and page E-34 (fourth paragraph) gives related impacts of reservoirs on flood plain land and downstream water. Page E-36, as you indicate, discusses increased fertilizer use. Use of fertilizers and other farm chemicals is expected to increase; particularly on the flood plain. Reduced flooding and scouring plus detention of water by reservoirs and land treatment measures will decrease erosion and movement of soil (and chemicals) from the watershed; more than offsetting the effect of increased chemical use; with less pollution downstream.

"Potential for increased stream pollution resulting from the clearing of riparian and flood plain vegetation."

Page E-15 (first paragraph) as you mention, discusses clearing of timber on the flood plain. Page E-28 deals with this and related problems in the watershed. Such clearing is expected to continue without regard to project activities. Frequent flooding does not deter clearing in this watershed. It appears the only deterrent may be the incompatibility of small irregular tracts with modern farm machinery. Because the future "without project" condition will be without the timber, the project will not affect the clearing; so this is not discussed as a project impact.

"The loss of the flood plain environment and the associated biota due to a changed flow regime and land clearing."

The effects of land clearing have been previously discussed. Pages E-30 through E-34 include several statements related to the effects of the altered flow regime. We do not expect a loss of flood plain environment and associated biota due to project installation, however. Flooding will still occur on 2,320 acres annually.

"Potential for the conversion of protected agricultural land to other more intense uses and the associated impacts."

We believe the potential is not as great as you suggest. The prime farm land acreage you mention from page E-15 will be affected; but page E-33 as modified only cites a net increase of about 227 acres. The creation of prime farm land thusly does not, of itself, bring significant potential for changes to more intensive uses. We agree the potential exists, however, and have inserted a statement on page E-36 dealing with the danger of intense flood plain development and resultant increase in flood damage potential.

Comment:

The water supply and recreation benefits of the multipurpose facility may promote more intense development of the upstream watershed, particularly if the year 2020 population projection provided in the draft statement is realized. This development could adversely affect the water quality of the reservoir if not adequately controlled and should be addressed in the final statement. If development is expected to result in significant adverse impacts, the appropriate land use controls to be implemented should also be identified.

Disposition:

More intense development in the upper end of the watershed is occurring and is expected to accelerate. This will happen with or without the project, however. It is mostly due to its proximity to Kansas City and improved highways. Discussions in the EIS of water problems (E-24), recreational problems (E-27), and economic and social problems (E-29) mention some of the needs thereby created.

We agree that the increased development could adversely affect the quality of water in the multipurpose lake.

Kansas Department of Health and Environment and Miami County are responsible for the necessary regulations, zoning, building permits, etc., to maintain, among other things, acceptable stream water quality. Middle Creek Township, which contains most of the drainage area of the multipurpose structure, has zoning and building regulations.

Once the multipurpose reservoir is established, the Kansas Forestry, Fish and Game Commission will monitor water quality and maintain the lake in a suitable condition for planned recreational use (see page E-12).

Comment:

Page E-36 states, "Flood plain residents, estimated at 150 people, will have improved living conditions and economic and psychological security from reduced flooding." We agree this function of the proposed project can generally be considered a benefit. However, because it reduces the hazard associated with the more common flood event, it may also establish a false sense of security to the flood plain residents which can result in an increase in the hazard to life and property associated with the uncommon or catastrophic flood event. This concern should be addressed in the final statement, particularly in view of the President's recent Executive Order which directs that each Federal agency shall provide leadership and shall take action to reduce the risk of flood losses, etc. (E.O. 11988, Federal Register Volume 42, No. 101). Such measures as land use controls may be warranted to preclude this project effect.

Disposition:

We agree and have inserted a statement on page E-36 as you suggest and as we noted in response to a previous comment. Also, we are preparing a publication, "Project Data and Flood Hazard Information Report." Copies will be furnished to responsible county commissions, state agencies, and other concerned entities. Its purpose will be to delineate remaining flood hazard, aid flood plain planning and management, and help prevent unwise development. It will be completed and distributed prior to project construction.

We have also corrected the estimate of flood plain residents to 12 people in lieu of 150. Although 46 farms with 150 (estimated) people have land in the flood plain, a maximum of four residences with 12 (estimated) people are in the flood plain.

Comment:

Peak discharges at the outlet of each reach of the watershed are included in the draft statement. The assumptions used in developing these figures should be provided including an evaluation of the significance of each assumption relative to the numbers provided. For example, it should be explained why the discharge at the outlet of Reach V with a drainage area of 29.6 square miles is signficantly greater for all frequency floods than the discharge at the outlet of Reach I with a drainage area of 69.8 square miles. This inverse relationship of drainage area to peak discharge is also described for other reaches of the watershed.

Disposition:

Peak discharges and related parameters are achieved through hydrologic modelling by electronic computer. The watershed is subdivided into small hydrologic units and the significant physical characteristics of each unit are evaluated and utilized in the model. Factors evaluated include size, shape, and slope of unit; sizes, lengths, and slopes of water courses; types of soils; geology, vegetative cover; and other physical features such as terraces, waterways, and other conservation practices, as applicable. These models are calibrated to generate peak discharges consistent with USGS stream gage data and frequencies derived therefrom for historical storms.

The shape of Middle Creek Watershed is the primary cause of the unusual relationship of peak discharge to drainage area for uniform storms over the watershed. The shape and hydraulic characteristics of the drainage area in the upstream reaches cause peak discharges from the various tributaries to combine and form a high peak in the mainstem. This peak dissipates as it moves downstream. The narrower watershed shape and the arrangement of tributaries in the downstream reaches are such that tributary peaks do not reach the mainstem simultaneously, but move downstream and dissipate more or less separately, ahead of the larger peak generated in the headwaters.

Comment:

The flood damage reduction data provided on page E-32 indicate the proposed project is expected to result in a 63 percent reduction in the average annual flood damage over the entire flood plain. The expected flood damage reduction

varies from 59 percent in the lower reaches to 76 percent in the upper reaches of the watershed. The statement should describe the type and extent of the rainfall event used to develop the damage reduction figures. Since the runoff control structures are all located in the upper reaches of the watershed, it should be explained how a 59 percent reduction of flood damages could be achieved if a localized, high-intensity storm (which is common to this area) was isolated over the lower three reaches of the watershed.

Disposition:

Uniform storms are assumed to occur over the entire watershed, ranging from small to large in inverse proportion to frequency of occurrence. It is true that damage reduction benefits would be below average for a storm centered over the lower part of the watershed. It is also true that benefits would be above average for a storm on the upper portion. The figures shown represent the average for all storms expected to occur over the 100-year evaluation period.

Comment:

The project map identifies the location of four detention dams which would affect runoff from approximately 1,700 acres. These structures were not specifically addressed in the draft statement, although they may have been included as part of the voluntary land treatment measures. However, since they are part of the proposed project, the structures and their associated impacts (e.g., impacts to crops and other biota in the detention pools) should be assessed.

Disposition:

The four detention dams are part of the voluntary land treatment portion of the project. Impacts of land treatment are discussed on page E-30. We are adding information about the detention dams and their impacts on pages P-2, E-5, E-30, and E-38.

Comment:

Since the project alternative section of the statement was developed under the Water Resources Council's Principles and Standards for Planning Water and Related Land Resources, we made an effort to direct our comments in such a way as to be meaningful to this planning approach. We believe the

alternative section of the statement, including appendices A and B, should be expanded to address the following concerns in order to facilitate an adequate evaluation of the merits of each alternative.

The text of the alternative section should address the significant environmental impacts associated with each alternative.

The economic value of the agricultural and other production foregone in the areas committed to the project should be included in the adverse effects in the National Economic Development (NED) account.

The natural beauty category of the Environmental Quality (EQ) account for the selected plan should include the project induced alteration of the downstream flood plain environment (e.g., the loss of riparian/flood plain timber).

The irreversible and irretrievable commitment category of the EQ account for the selected plan should include expected land use changes in both the watershed and the protected reach of Middle Creek. For example, expanded development of the watershed above the multipurpose reservoir for residential use due to the improved water supply and recreation facilities would be, for all practical purposes, an irreversible commitment of the land resource.

The final statement should explain why Alternatives No. 1 and 2 were not included in the Summary Comparison of Alternative Plans.

The comprehensive land use plan addressed under Alternative No. 4 (page E-39) should be included in the Life, Health and Safety category of Social Well-Being Account of the Summary Comparison of Alternative Plans.

Alternative No. 4 (EQ plan) lists several items which would serve to improve the environmental quality of the project area. These are a fish management program for Middle Creek, easement on 440 acres of riparian habitat for preservation and management, and a comprehensive land use plan. The selected plan, which is also the NED plan, does not include any of these items. Since the selected plan is supposed to represent a merger of the NED and EQ plans, the statement

should explain why none of the features of the EQ plan were included in the selected plan as opposed to the entire NED plan being accepted.

Disposition:

"The text of the alternative section should address the significant environmental impacts associated with each alternative."

We agree. The alternatives section has been expanded and made consistent with Appendix B, Summary Comparison of Alternative Plans.

"The economic value of the agricultural and other production foregone in the areas committed to the project should be included in the adverse effects in the National Economic Development (NED) account."

The updated NED account shows $213,900 for project installation as an adverse effect. Although the various components are not identified, they include the cost of land rights (purchases, easements, etc.). Land rights costs reflect land prices which represent the value of foregone future production in terms of current value.

"The natural beauty category of the Environmental Quality (EQ) account for the selected plan should include the project induced alteration of the downstream flood plain environment (e.g., the loss of riparian/flood plain timber)."

Please refer to the earlier discussion of flood plain clearing. Future without project conditions include the loss of riparian/flood plain timber. Imposition of the project will therefore not affect this loss.

"The irreversible and irretrievable commitment category of the EQ account for the selected plan should include expected land use changes in both the watershed and the protected reach of Middle Creek. For example, expanded development of the watershed above the multipurpose reservoir for residential use due to the improved water supply and recreation facilities would be, for all practical purposes, an irreversible commitment of the land resource."

We agree that such development for residential use will be an irreversible commitment of the land resource. This development is not taking place as a project impact, however. The impact of the project will not be to cause the development, but to supply some of the water and recreational needs of the expanded population. Hence, we do not discuss this expected land use change as a project impact.

> "The final statement should explain why Alternatives No. 1 and 2 were not included in the Summary Comparison of Alternative Plans."

Footnote "a" to the Summary Comparison of Alternative Plans has been expanded to explain that Alternatives No. 1 and 2 are not included because they have little impact on significant problems and needs. The reader is referred to the Impacts Section for information on Alternatives 1 and 2.

> "The comprehensive land use plan addressed under Alternative No. 4 (page E-39) should be included in the Life, Health and Safety category of Social Well Being Account of the Summary Comparison of Alternative Plans."

It is not included because we are unable to associate it with any significant impacts relative to this account.

Comment:

Alternative No. 4 (EQ plan) lists several items which would serve to improve the environmental quality of the project area. These are a fish management program for Middle Creek, easements on 440 acres of riparian habitat for preservation and management, and a comprehensive land use plan. The selected plan, which is also the NED plan, does not include any of these items. Since the selected plan is supposed to represent a merger of the NED and EQ plans, the statement should explain why none of the features of the EQ plan were included in the selected plan as opposed to the entire NED plan being accepted.

Disposition:

It is true that the selected plan includes all of the elements of the NED plan. It is not true, however, that none of the features of the EQ plan are in the selected

plan. The accelerated land treatment, recreational facilities and wildlife features at the multipurpose structure and the removal of log jams from Middle Creek are EQ features of the selected plan.

Aside from this, the Principles and Standards planning process allows selection of the NED plan, EQ plan, or any alternative between the two. The Soil Conservation Service encourages sponsors and other interested public bodies to choose EQ elements as well as NED elements. The sponsors made this plan selection under these guidelines. It is their plan, to be carried out by them, with assistance of the Soil Conservation Service subject to authorization by appropriate committees of Congress. No eligible potential sponsor emerged to finance the balance of the EQ features.

For subsequent comments and suggestions by the Environmental Protection Agency and responses by the Soil Conservation Service see letters dated August 5, September 23, and October 13, 1977, in Appendix C.

APPROVED BY _____
State Conservationist

JAN 5 1978
Date

SELECTED REFERENCES

1. All information and data, except as otherwise noted by reference to source, were collected during watershed planning investigations by the Soil Conservation Service, U.S. Department of Agriculture.

2. Kansas Extension Forester and U.S. Forest Service, "Forestry Work Plan, Middle Creek Watershed," July, 1968.

3. Kansas State Department of Health and Environment, "Water Quality Criteria for Interstate and Intrastate Waters of Kansas," 1973.

4. U. S. Department of the Interior, Fish and Wildlife Service, Report of recommended wildlife mitigation measures, January, 1977 (unpublished).

5. U. S. Department of Commerce, Bureau of the Census, "U.S. Census of Population: 1970 -- Number of Inhabitants, Kansas."

6. Kansas Water Resources Board, "Kansas Water Atlas," 1967.

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14. Kansas State Park and Resources Authority, "An Outdoor Plan for Southeast Kansas," Kansas Planning for Development Report Number 31, 1970.

15. Kansas State Historical Society, letter reports on archeological surveys, August 13, 1976, and August 29, 1977.

16. Kansas State Historical Society, "Historic Preservation in Kansas, Vol. 2, 1973 Inventory of Historic Sites," 1973; and "Historic Preservation in Kansas, Vol. 2, 1974 Supplement Inventory of Historic Sites", 1974.

17. U. S. Department of the Interior, National Park Service, "The National Register of Historic Places," 1972 (as supplemented).

18. Kansas Water Resources Board, "Irrigation in Kansas", 1967.

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20. Middle Creek Watershed Joint District No. 50, Minutes of meeting of the Board of Directors, January 31, 1973.

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23. Kansas Academy of Science, "Transactions of the Kansas Academy of Science," 76:2, 3, and 4 and 77:1.

24. Kansas Department of Agriculture, "Annual Voluntary Applicators Reports, 1974," unpublished.

25. Kansas Water Resources Board, staff report "Agricultural, Municipal, and Industrial Water Supply, Middle Creek Watershed," March 24, 1970, unpublished.

26. U.S. Department of the Interior, Fish and Wildlife Service, "Tri-Agency Terrestrial Habitat Evaluation, Middle Creek Watershed, Miami and Linn Counties, Kansas," undated, unpublished.

LIST OF APPENDIXES

A P P E N D I X A

Display Accounts for Selected Alternative

National Economic Development Account

Environmental Quality Account

Regional Development Account

Social Well-being Account

SELECTED ALTERNATIVE

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

MIDDLE CREEK WATERSHED

Components	Measures of Effects (average annual dollars)[b]	Components	Measures of Effects (average annual dollars)[b]
Beneficial effects		Adverse effects	
A. The value to users of increased outputs of goods and services		A. The value of resources required for a plan	
1. Flood prevention	330,700	1. Project Installation[a]	213,900
2. Agricultural, municipal, and industrial water supply	57,100	2. Operation, Maintenance, and Replacement	30,300
3. Recreation	112,500	3. Project Administration[a]	52,300
Total beneficial effects	500,300	Total adverse effects	296,500
		Net beneficial effects	203,800

a/ 100 years at 6 3/8 percent interest.

b/ Price Base: Water Resources Council July 1976 Current Normalized for crop and pasture, and flood plain scour; 1976 prices for other items.

Note: Land treatment beneficial effects were not evaluated. Land treatment installation costs are $497,700.

August 1977

SELECTED ALTERNATIVE

ENVIRONMENTAL QUALITY ACCOUNT

MIDDLE CREEK WATERSHED

Components	Measure of effects
Beneficial and adverse effects	
A. Areas of natural beauty	1. Increase economic conditions to aid general appearance of the 69.8 sq. mi. watershed.
	2. Increase water supply for improvement of farmstead appearances.
	3. Improve appearance of forest land and rangeland through additional plantings, farm ponds, better management, and fire control.
	4. Increase landscape diversity by creation of seven lakes of 22 to 50 acres each on private land.
	5. Provide a 281 acre lake surrounded by 344 acres for public use and wildlife management.
	6. Inundate 531 acres of land and 9.6 miles of intermittent stream.
	7. Disrupt rural environment by 50,000 recreation visits per year at the multi-purpose site.
B. Quality considerations of water, land and air resources.	1. Reduce soil loss from erosion by 10 percent on 4,146 acres of cropland, grassland, and forest land.
	2. Decrease suspended sediment load by 9 to 14 percent in Middle Creek and tributaries.
	3. Reduce scour and sediment deposition on 1,225 acres.
	4. Increase prime farm land by 227 acres.

August 1977

SELECTED ALTERNATIVE

ENVIRONMENTAL QUALITY ACCOUNT
(continued)

Middle Creek Watershed

Components	Measures of Effects
	4. Control flood runoff from 43 percent of the watershed to reduce flood plain damage 64 percent and decrease average peak flood flow by 54 percent at the watershed outlet.
	5. Increase fire protection on 20,735 acres of grassland and forest land.
C. Biological resources and selected ecosystems.	1. Enhance habitat, food supply, and water source for terrestrial wildlife on 5,530 acres of grassland and 825 acres of forest land.
	2. Increase warm water fishing potential by 250 acres in seven lakes on private land.
	3. Provide a fishery resource in the 281 acre public lake.
	4. Inundate 9.6 miles of intermittent stream and 531 acres of terrestrial habitat.
	5. Cause a net loss of 164 H.U. of woodland, 53 H.U. of odd area habitat, and a net gain of 304 H.U. of herbaceous habitat.
D. Irreversible or irretrievable committments.	1. Permanent flooding of 531 acres and 9.6 miles of intermittent stream.
	2. Occasional flooding of 532 acres by flood water retarding structures.
	3. Construct dams and spillways on 79 acres.

August 1977

SELECTED ALTERNATIVE

REGIONAL DEVELOPMENT ACCOUNT

MIDDLE CREEK WATERSHED

Components	Measures of Effects (average annual dollars) State of Kansas	Rest of Nation
Income		
Beneficial effects		
A. The value of increased output of goods and services to users residing in the region		
1. Flood prevention	330,700	0
2. Water supply	57,100	0
3. Recreation	95,900	16,600
4. The utilization of regional unemployed or underemployed labor resources		
a. Project construction	98,100	- 98,100
5. Additional wages and salaries accruing to the region from implementation of the plan		
a. Recreation service sector	7,500	- 7,500
b. Project Operation, Maintenance, and Replacement (structures and land treatment)	9,300	- 9,300
B. The value of output to users residing in the region from external economies		
1. Indirect activities associated with increased net returns from flood prevention	129,700	-129,700
Total beneficial effects	728,300	-228,000

Components	Measures of Effects (average annual dollars) State of Kansas	Rest of Nation
Income		
Adverse effects		
A. The value of resources contributed from within the region to achieve the outputs		
1. Project installation[a/]	65,400	148,500
2. Operation, Maintenance, and Replacement	30,300	0
3. Project administration[a/]	700	51,600
B. Losses of output resulting from external diseconomies to users residing in the region		
1. Indirect activities from multipurpose reservoir take area	51,300	- 51,300
Total adverse effects	147,700	148,800
Net beneficial effects	580,600	-376,800

a/ 100 years at 6 3/8 percent interest

August 1977

SELECTED ALTERNATIVE

REGIONAL DEVELOPEMENT ACCOUNT

MIDDLE CREEK WATERSHED

Components	Measures of effects	
	State of Kansas	Rest of Nation
Employment		
Beneficial effects		(none)
A. Increase in the number & types of jobs		
1. Agricultural employment	Utilization of 8.9 man years of employment in agricultural production	
2. Employment in recreation service sector	3.9 permanent seasonal semi-skilled jobs	
3. Employment for project construction	9.8a/ Semi-skilled jobs for seven years	
4. Employment for project OM&R	.7 permanent semi-skilled job	
5. Indirect and induced employment for project installation and output of project's goods and services	6.4 permanent semi-skilled jobs	
Total beneficial effects	16.0 permanent semi-skilled jobs 3.9 permanent seasonal semi-skilled jobs 9.8 a/ semi-skilled jobs for seven years	

Components	Measures of effects	
	State of Kansas	Rest of Nation
Employment		
Adverse effects		(none)
A. Decrease in number & types of jobs		
1. Lost in agricultural employment	2.0 man-year of agricultural employment	
2. Lost in indirect and induced employment	1.4 permanent semi-skilled jobs	
Total adverse effects	3.4 permanent semi-skilled jobs	
Net beneficial effects	12.6 permanent semi-skilled jobs	
	3.9 permanent seasonal semi-skilled jobs	
	9.8 a/ semi-skilled jobs for 7 years	

a/ 68.6 total man-years

August 1977

SELECTED ALTERNATIVE

REGIONAL DEVELOPMENT ACCOUNT
(continued)

MIDDLE CREEK WATERSHED

Components	Measures of effects	
	State of Kansas	Rest of Nation
Population Distribution		
Beneficial effects	Creates 12.6 permanent semi-skilled jobs, 3.9 permanent seasonal jobs and 9.8 semi-skilled jobs for 7 years.	-
Adverse effects	-	-
Regional Economic Base and Stability		
Beneficial effects	Provides 3,000 acre feet of water for industrial, municipal, recreational, and agricultural use. Creates 16.5 permanent semi-skilled jobs and 68.6 short-term semi-skilled jobs in an area where 11.6 percent of the families have incomes less than the national poverty level.	-

SELECTED ALTERNATIVE

SOCIAL WELL-BEING ACCOUNT

MIDDLE CREEK WATERSHED

Components	Measures of Effects
Beneficial and adverse effects	
A. Real income distribution	1. Create 16.5 low to medium income permanent jobs for area residents.
	2. Create regional income benefit distribution of $728,300 by income class as follows:

Income Class (dollars)	Percentage of Adjusted Gross Income in Class	Percentage Benefits in Class
Less than 3,000	15	5
3,000 to 10,000	50	55
More than 10,000	35	40

3. Local costs to be borne by region total $147,700 with distribution by income class as follows:

Income Class (dollars)	Percentage of Adjusted Gross Income in Class	Percentage Contributions in Class
Less than $3,000	15	5
3,000 to 10,000	50	55
More than 10,000	35	40

B. Life, health and safety	1. Provide 63 percent flood damage reduction.
	2. Increased output will be in feed grains, wheat and soybeans.
C. Recreational opportunities	1. Create 50,000 recreational visitor-day activities mostly for a population outside of Linn and Miami counties.

A P P E N D I X B

Summary Comparison of Alternative Plans

SUMMARY COMPARISON OF ALTERNATIVE PLANS

MIDDLE CREEK WATERSHED

Miami and Linn Counties, Kansas

ACCOUNT	ALTERNATIVE 3[a]	ALTERNATIVE 4[b]	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7
National Economic Development					
Income (dollars)					
Beneficial effects	$ 500,300	$ 245,300	$ 188,800	$ 391,700	$ 330,700
Adverse effects	296,500	233,600	144,400	234,900	192,300
Net beneficial effects	203,800	11,700	44,400	156,800	138,400
Environmental Quality					
Beneficial and Adverse					
A. Areas of Natural Beauty					
Preserve riparian woodland wildlife habitat with easement-acres	No effect	440	No effect	No effect	No effect
Increase landscape diversity with water in sediment pools-no. of lakes	8	1	1	1	8
Create 281 acre lake with public use recreation area and wildlife management areas	yes	yes	yes	yes	No effect
Disrupt rural setting with noise & litter by increased recreation visit	50,000	58,000	50,000	50,000	No effect

August 1977

SUMMARY COMPARISON OF ALTERNATIVE PLANS
(continued)

ACCOUNT	ALTERNATIVE 3[a]	ALTERNATIVE 4[b]	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7
Environmental Quality					
B. Quality Considerations of Water, Land and Air Resources					
Reduce sediment yield to mainstem of Middle Creek - tons/year	36,000	21,000	17,900	20,000	36,000
Reduce sediment yield to Marias des Cygne River - tons/year	29,800	17,400	14,800	16,400	29,800
Reduce erosion on significant sediment source areas by 12-23 tons/acre - acres	3,295	3,295	3,295	3,295	3,295
Reduce erosion on moderate sediment source areas by 4-12 tons/acre - acres	5,590	6,577	5,590	5,590	5,590
Reduce flood plain scour on 1,255 acres - percent	54	37	37	44	55
C. Biological Resources and Selected Ecosystems					
Enhance terrestrial wildlife habitat - acre	210	839	210	210	No effect

August 1977

SUMMARY COMPARISON OF ALTERNATIVE PLANS
(continued)

ACCOUNT	ALTERNATIVE 3[a]	ALTERNATIVE 4[b]	ALTERNATIVE 5	ALTERNATIVE 6	ALTERNATIVE 7
Environmental Quality					
Convert terrestrial wildlife habitat to aquatic habitat - acres	531	243	243	243	477
Convert intermittent stream to permanent water - miles	9.6	4.2	4.2	4.2	8.0
Regional Development					
State of Kansas					
A. Income (dollars)					
Beneficial effects	728,300	312,300	236,900	505,900	461,500
Adverse effects	147,700	167,100	106,000	125,200	91,600
Net beneficial effects	580,600	145,200	130,900	380,700	369,900
B. Employment					
Project construction (man years)	68.5	46.6	20.1	44.5	60.2
Project operation and maintenance (man years)	.7	.8	1.2	2.4	.4
Agricultural and recreation (man years)	15.1	6.6	6.6	13.6	12.4
Indirect from project construction	7.9	2.7	1.9	3.1	3.1

SUMMARY COMPARISON OF ALTERNATIVE PLANS
(continued)

ACCOUNT	ALTERNATIVE 3[a/c/]	ALTERNATIVE 4[b/c/]	ALTERNATIVE 5[c/]	ALTERNATIVE 6[c/]	ALTERNATIVE 7[c/]
Social Well-Being					
Beneficial and adverse effects					
A. Real income distribution					
Create low to medium income permanent jobs for area residents (man years)	19.4	10.1	9.7	19.1	15.1
Create regional income benefits - (dollars) (distributed as shown for the selected alternative in the Social Well-Being Account)	728,300	312,300	236,900	505,900	461,500
Local costs to be borne by region (dollars) (distributed same as regional income benefits)	147,700	167,100	106,000	125,200	91,600
B. Life, health, and safety					
Provide flood protection to flood plain land - percent damage reduction	63	23	15	44	63

SUMMARY COMPARISON OF ALTERNATIVE PLANS
(continued)

ACCOUNT	ALTERNATIVE 3[a/c/]	ALTERNATIVE 4[b/c/]	ALTERNATIVE 5[c/]	ALTERNATIVE 6[c/]	ALTERNATIVE 7[c/]
Social Well-Being					
Provide water for municipal, agricultural, and industrial use (acre feet)	834	No effect	834	834	No effect
C. Recreation					
Create recreational opportunity (recreation visits)	50,000	58,000	50,000	50,000	No effect
Provide recreational water (acre feet)	2,166	2,166	2,166	2,166	No effect

a/ Selected Plan and NED Plan. Alternatives 1 & 2 (consisting of no action and accelerated land treatment respectively) are not displayed because they have little impact on significant problems and needs. Please see the Alternatives Section for information on Alternatives 1 & 2.

b/ Environmental Quality Plan.

c/ 100 years at 6 3/8 percent interest.

Note: Land treatment beneficial effects were not evaluated. Land treatment installation costs for the Selected Plan and Alternatives 3, 5, 6, and 7 are $497,700 each; land treatment installation cost for Alternative 4 is $672,000.

A P P E N D I X C

Letters of Comments Received on the Draft Plan/EIS

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

10 June 1977

Honorable Rupert Cutler
Assistant Secretary of Agriculture
Washington, D.C. 20250

Dear Mr. Cutler:

In compliance with the provisions of Section 5 of Public Law 566, 83rd Congress, the Kansas State Conservationist of the Soil Conservation Service, by letter dated 15 April 1977, requested the views of the Secretary of the Army on the work plan and draft environmental statement for the Middle Creek Watershed, Miami and Linn Counties, Kansas.

We have reviewed this work plan and foresee no conflict with any projects or current proposals of this Department. The draft environmental statement satisfies the requirements of Public Law 91-190, 91st Congress, insofar as this Department is concerned.

Sincerely,

Charles R. Ford

Charles R. Ford
Acting Assistant Secretary of the Army
(Civil Works)

VANGUARD of FREEDOM
BICENTENNIAL 1775-1975
UNITED STATES ARMY

AMERICAN REVOLUTION BICENTENNIAL
1776-1976

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-77/383

JUN 23 1977

Mr. Robert K. Griffin
State Conservationist
Soil Conservation Service
Department of Agriculture
Post Office Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

Thank you for your letter of April 15, 1977, requesting our comments on the work plan and draft environmental impact statement for the Middle Creek Watershed Project, Miami and Linn Counties, Kansas.

According to the reports, conservation land treatment, seven floodwater retarding dams, and one multipurpose structure are proposed to provide for watershed protection, flood prevention, water supply, and public recreation in the 46,765-acre watershed in eastern Kansas. Land use would be affected on 1,378 acres at the sites of structural measures.

We have commented on the combined document. The draft environmental statement and watershed plan does a good job of addressing significant project impacts on fish, wildlife and their habitat and in detailing measures which will be taken to lessen those impacts.

In accordance with subsection (2) of Section 12 of Public Law 566, we request that the report of the Fish and Wildlife Service on the Middle Creek Watershed Project become an attachment to this report when it is transmitted to the Congress.

The actions proposed in this work plan will not adversely impact on established units of the National Park System or National Landmarks. Further, we do not anticipate any adverse impacts on the mineral resource base from this proposal nor will the plan adversely affect the lands or programs administered by our Bureau of Land Management or our Bureau of Reclamation.

Land, Pages P-12, E-1, E-30

We have problems with the relatively recent position of the Kansas office of the Soil Conservation Service regarding downstream floodplain clearing by private landowners as a result of installation of P.L. 566 structures on upstream drainages. The innate susceptibility of particular stands of bottomland timber to frequent, natural flooding is a definite economic deterrent - sometimes the only deterrent - to their clearing by landowners for conversion to agricultural land. When the installation of P.L. 566 or other water retarding structures removes flooding as a serious consideration, that disincentive is removed.

In recent responses to Fish and Wildlife Service Kansas City field office's comments on draft environmental impact statements, the SCS has maintained the view that natural flooding is not a deterrent to timber clearing and conversion of the land to agricultural use. This is an abrupt departure from former policy, in effect at least as recently as six years ago, that such clearing for agricultural use was considered a project benefit in nearly all Kansas watershed plans forwarded to Congress. The possibility of project induced floodplain timber clearing for agricultural purposes is real and should be fully addressed in the environmental statement especially as it relates to impacts on wildlife habitat and wildlife populations.

Water Resources, Pages E-3, E-6, App. G, Tables G-1, 2

Water quality in the lake behind the proposed multipurpose dam should be further discussed, particularly with respect to potential algae blooms. Water analyses for the watershed indicate that phosphate and nitrate concentrations may be sufficiently high to produce blooms in a shallow lake.

The statement should address effects on ground water levels of the prolonged impoundment of water in the multipurpose reservoir.

Cultural Resources, Pages P-7, E-3, E-20

The Soil Conservation Service, in coordination with the State Historic Preservation Officer, should first complete any cultural surveys that may be necessary to identify properties eligible for the National Register in the area of project impact.

The statement indicates that responsibility for mitigating adverse effects on cultural resources lies with the Secretary of the Interior. We cannot agree with Soil Conservation Service's position regarding this interpretation of the Archeological and Historic Preservation Act of 1974, Public Law 93-291. This responsibility for developing mitigating measures rests with the Federal agency taking the action.

The application of Public Law 93-291 is appropriate only after all planning steps mandated by the National Environmental Policy Act of 1969, the National Historic Preservation Act of 1966, and Executive Order 11593 are completed; thus, the Act augments but does not substitute for this legislation. The requirements of the Acts and Executive Order are specified in the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800).

The results of the Soil Conservation Service's implementation of the Council's "Procedures," along with the State Historic Preservation Officer's comments and any other pertinent documentation, should be included in the final statement.

There are additional areas where adjustments or clarification might be helpful.

Page E-15, Paragraph 1--We question whether 100 percent of the floodplain land (1,495 acres plus 3,006 acres = 4,501 acres) should be considered prime agricultural land even if there were no flooding. The miscellaneous category of floodplain land usually includes streambed, streambank, and other relatively nonusable areas. Further, paragraph 2 on page E-3 states that 587 acres now frequently flooded will be reclassified as prime agricultural land.

Page E-38, Alternatives--We believe the differences in the following figures should be explained or reconciled.

	Page E-38	Page P-19
Ongoing Treatment-Alternate 1	$ 875,700	$ 877,200
Accelerated Treatment-Alternate 2	$ 495,000	$ 497,700
Project Costs-Alternate 3	$4,267,500	$4,270,500

It appears the ongoing program is a part of each alternative. If this is correct, it would seem the ongoing treatment cost of $875,700 (or $877,200) should be included in the cost of each alternate to show a comparable cost analysis.

Page E-41, Last Full Paragraph--It is noted that the ongoing treatment cost of $877,200 has not been included in consideration of irretrievable commitment of resources.

We hope these comments will be of assistance.

Sincerely,

Deputy Assistant SECRETARY

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20201

June 10, 1977

Mr. Robert K. Griffin
State Conservationist
United States Department of Agriculture
Soil Conservation Service
P.O. Box 600
Salina, Kansas 67401

Dear Sir:

We have reviewed the draft Environmental Impact Statement for Middle Creek Watershed, Miami and Linn Counties, Kansas, and we feel that issues of concern to this Department have been adequately addressed.

Sincerely,

Charles Custard
Director
Office of Environmental Affairs

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333
TELEPHONE: (404) 633-3311

June 13, 1977

Mr. Robert K. Griffin
State Conservationist
USDA Soil Conservation Service
Post Office Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

Thank you for the draft plan and environmental impact statement on the Middle Creek Watershed Project, Linn and Miami Counties, Kansas. We have reviewed the EIS for potential vectorborne disease impacts and believe that risks of vectorborne disease transmission associated with this development are minimal.

The CDC's Water Resources Activity, previously directed by Dr. Richard O. Hayes in Ft. Collins, Colorado, has corresponded with your office on the Middle Creek project since mid-1976. Also, we have had close contact with Mr. Ray Cope, SCS Midwest Technical Service Center, Lincoln, Nebraska, who has advised that vector interests were being routinely considered in work plans being developed by the SCS. We note, however, that potential mosquito breeding conditions associated with the multipurpose reservoir have been omitted from the EIS. Even though large human population centers are not located near the reservoir, recreational usage will amount to 50,000 man-days which will occur mainly during the mosquito season. We believe, therefore, that mosquito control provisions should be included in the EIS.

Please let us know if we can provide additional information.

Sincerely yours,

Samuel G. Breeland

Samuel G. Breeland
Water Resources Activity
Chief, Medical Entomology Branch
Vector Biology & Control Division
Bureau of Tropical Diseases

cc: Mr. Ray Cope
Dr. Don Wilcox
HEW REgion VII

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

APR 27 1977

OFFICE OF EQUAL OPPORTUNITY

IN REPLY REFER TO: 8140 Supplement 8

SUBJECT: Draft Environmental Impact Statement and Watershed Plan for the Middle Creek Watershed, Kansas

TO: Robert K. Griffin
State Conservationist

THRU: Verne M. Bathurst
Deputy Administrator
for Management, SCS

The Draft Environmental Impact Statement (EIS) and Watershed Plan for the Middle Creek Watershed were reviewed by this office for the purpose of assessing the socio-economic impact of the proposed plan on minority groups living in or near the affected area.

A review of the Watershed Plan and the EIS revealed little information assessing the proposed plan's impact on minorities residing in the target area (0.7 percent in Linn County and 4.9 percent in Miami County).

In accordance with Soil Conservation Service Guidelines for preparing environmental impact statements (Federal Register, Vol. 39, No. 107, June 3, 1974), it is recommended that in your final draft you include an assessment of the social and economic impacts of the plan on the minority population.

JAMES FRAZIER
Director

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

WO

REPLY TO: 3510 Watershed Protection
and Flood Prevention (PL-566)

June 1, 1977

SUBJECT: Middle Creek Watershed, Kansas

TO: James W. Mitchell, Director,
Watershed Division, SCS

We have received the March 1977 draft watershed plan and environmental impact statement for the above named watershed.

We have the following comments:

1. Page-5, last paragraph, third sentence--change to read, "The SCS and the Kansas State and Extension Forester in cooperation with the U.S. Forest Service will provide technical assistance."

2. Page-19, table 1, Land Treatment--"Fire Control" should be listed under the heading, "Individual Practices such as."

3. Page E-6, second paragraph, first sentence--change to read, "Forestry technical assistance will be provided by the Kansas State and Extension Forester in cooperation with the U.S. Forest Service through the PL-566 and Cooperative Forest Management Programs to serve forest land needs in the project."

4. Page E-21, last paragraph--we feel that this statement needs to be softened or qualified. The operator or owner of forest land does not necessarily have to be a cooperator before technical assistance can be given for the application of forest land treatment measures. In line two of this sentence, add "agricultural" before "land treatment measures."

5. Page E-29, first paragraph--delete first sentence and substitute, "A large portion of the forest land has not received any type of management in the past. As a result, most of the forest land has poor quality and low value trees. Such forest stands give little economic return. However, many forest sites have a good growth potential for valuable commercial tree species. Some of these areas have. . .etc."

6. Page E-29, Relationship To Land Use Plans, Policies, And Controls - add a sentence or two about the efforts of the Lake Region RC&D area and the Regional Planning Commission both of which deal with land use planning.

7. Appendix F, Definitions of Conservation Treatment Practices - add the following to Appendix F, "Fire Control: This measure applies to the prevention of wildfires in forest land, application of approved fire protection and prevention methods, effective control of going fires, and development of fire prevention educational programs."

Philip L. Archibald

PHILIP L. ARCHIBALD
Director of Area Planning
and Development

cc: R-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
1735 BALTIMORE
KANSAS CITY, MISSOURI 64108

July 1, 1977

Mr. Robert K. Griffin
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

Middle Creek Watershed, Linn
and Miami Counties, Kansas

We have reviewed the Draft Environmental Impact Statement for the project identified above. The draft statement has been rated "3", inadequate. This rating means our agency believes the final statement should include additional information in order to allow an adequate evaluation of the project. The following are our specific comments on the statement.

The final statement should address the need for a permit pursuant to the requirements of Section 404 of P.L. 92-500. If a permit is required, the final statement should provide an evaluation consistent with the Section 404 (b) guidelines (Federal Register Volume 40, No. 173).

The need for water supply as a project purpose is supported by projections that present water sources are inadequate to satisfy future needs in eastern Miami County. The statement (page E-27) indicates population projections range up to a 300 percent increase by the year 2020. These projections appear somewhat high since both Linn and Miami Counties had a population loss between 1960 and 1970 of 6.1 percent and 3.2 percent respectively (pages E-12 and E-13). In addition, information developed by the Population Research Laboratory at Kansas State University, as of June 18, 1976, shows the Linn County population decreasing to 6,899 by the year 2000 from the 1970 population of 7,770. Correspondingly, the Miami County population is only expected to increase from the 1970 population of 19,254 to 26,000 by the same year. Neither the information provided on pages E-12 and E-13 of the draft statement nor the research study support the projected 300 percent population increase. If the 300 percent figure was used to determine

the 2020 water requirement (1.48 mgd), the source of the projection and reason for selecting it over more conservative estimates should be provided in the final statement.

Page E-27 of the draft document states, "Although surface water quality is generally good, no existing impoundments are large enough for needs of the area." This statement should be expanded to address the Hillsdale Reservoir project currently under construction by the U.S. Army Corps of Engineers. The Hillsdale project includes water supply storage and should be evaluated as a water supply source for the project area.

Several items mentioned in the draft statement indicate the proposed project may promote significant land use changes in the protected reach of Middle Creek. For example, page E-15 indicates 3,006 additional acres of the watershed flood plain would be prime agricultural land except for frequent flooding. In addition, the watershed is subject to continual land clearing efforts (page E-14) and page E-36 indicates the reduction in flood hazard would induce farmers to use more fertilizer, improve crop varieties and enhance rural area development through increased farm income, higher land values, decreased flood expenses, and a more stable economy. This information indicates farming or development are expected to be intensified as a result of the proposed project. However, no comprehensive evaluation of the impacts associated with this change in land use was provided. The project's effects on the downstream environment should be evaluated, including the following:

- Potential for increased use of farm related chemicals and the associated impacts.

- Potential for increased stream pollution resulting from the clearing of riparian and flood plain vegetation.

- The loss of the flood plain environment and the associated biota due to a changed flow regime and land clearing.

- Potential for the conversion of protected agricultural land to other more intense uses and the associated impacts.

The water supply and recreation benefits of the multipurpose facility may promote more intense development of the upstream watershed, particularly if the year 2020 population projection provided in the draft statement is realized. This development could adversely affect the water quality of the reservoir if not adequately controlled and should be addressed in the final statement. If development is expected to result in significant adverse impacts, the appropriate land use controls to be implemented should also be identified.

Page E-26 states, "Flood plain residents, estimated at 150 people, will have improved living conditions and economic and psychological security from reduced flooding." We agree this function of the proposed project can generally be considered a benefit. However, because it reduces the hazard associated with the more common flood event, it may also establish a false sense of security to the flood plain residents which can result in an increase in the hazard to life and property associated with the uncommon or catastrophic flood event. This concern should be addressed in the final statement, particularly in view of the President's recent Executive Order which directs that each Federal agency shall provide leadership and shall take action to reduce the risk of flood losses, etc. (E.O. 11988, Federal Register Volume 42, No. 101). Such measures as land use controls may be warranted to preclude this project effect.

Peak discharges at the outlet of each reach of the watershed are included in the draft statement. The assumptions used in developing these figures should be provided including an evaluation of the significance of each assumption relative to the numbers provided. For example, it should be explained why the discharge at the outlet of Reach V with a drainage area of 29.6 square miles is significantly greater for all frequency floods than the discharge at the outlet of Reach I with a drainage area of 69.8 square miles. This inverse relationship of drainage area to peak discharge is also described for other reaches of the watershed.

The flood damage reduction data provided on page E-32 indicate the proposed project is expected to result in a 63 percent reduction in the average annual flood damage over the entire flood plain. The expected flood damage reduction varies from 59 percent in the lower reaches to 76 percent in the upper reaches of the watershed. The statement should describe the type and extent of the rainfall event used to develop the damage reduction figures. Since the runoff control structures are all located in the upper reaches of the watershed, it should be explained how a 59 percent reduction of flood damages could be achieved if a localized, high-intensity storm (which is common to this area) was isolated over the lower three reaches of the watershed.

The project map identifies the location of four detention dams which would affect runoff from approximately 1,700 acres. These structures were not specifically addressed in the draft statement, although they may have been included as part of the voluntary land treatment measures. However, since they are part of the proposed project, the structures and their associated impacts (e.g., impacts to crops and other biota in the detention pools) should be assessed.

Since the project alternative section of the statement was developed under the Water Resources Council's Principles and Standards for

Planning Water and Related Land Resources, we made an effort to direct our comments in such a way as to be meaningful to this planning approach. We believe the alternative section of the statement, including appendices A and B, should be expanded to address the following concerns in order to facilitate an adequate evaluation of the merits of each alternative.

- The text of the alternative section should address the significant environmental impacts associated with each alternative.

- The economic value of the agricultural and other production foregone in the areas committed to the project should be included in the adverse effects in the National Economic Development (NED) account.

- The natural beauty category of the Environmental Quality (EQ) account for the selected plan should include the project induced alteration of the downstream flood plain environment (e.g., the loss of riparian/flood plain timber).

- The irreversible and irretrievable commitment category of the EQ account for the selected plan should include expected land use changes in both the watershed and the protected reach of Middle Creek. For example, expanded development of the watershed above the multipurpose reservoir for residential use due to the improved water supply and recreation facilities would be, for all practical purposes, an irreversible commitment of the land resource.

- The final statement should explain why Alternatives No. 1 and 2 were not included in the Summary Comparison of Alternative Plans.

- The comprehensive land use plan addressed under Alternative No. 4 (page E-39) should be included in the Life, Health and Safety category of Social Well-Being Account of the Summary Comparison of Alternative Plans.

- Alternative No. 4 (EQ plan) lists several items which would serve to improve the environmental quality of the project area. These are a fish management program for Middle Creek, easements on 440 acres of riparian habitat for preservation and management, and a comprehensive land use plan. The selected plan, which is also the NED plan, does not include any of these items. Since the selected plan is supposed to represent a merger of the NED and EQ plans, the statement should explain why none of the features of the EQ plan were included in the selected plan as opposed to the entire NED plan being accepted.

We appreciate the opportunity to review this draft statement. If we can be of further assistance in resolving the aforementioned concerns please contact our office. Please forward three copies of the final statement to this office for review when it is submitted to the Council on Environmental Quality.

Sincerely yours,

Charles V. Wright
Acting Regional Administrator

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
P. O. Box 600, Salina, Kansas 67401

August 5, 1977

Mr. Charles V. Wright
Acting Regional Administrator
U. S. Environmental Protection Agency
1735 Baltimore
Kansas City, Missouri 64108

Dear Mr. Wright:

Thank you for your comments of July 1, 1977, on the Draft Plan and Environmental Impact Statement for Middle Creek Watershed. They have been quite helpful in our effort to improve the final document.

We are enclosing copies of pages containing changes we propose in response to your comments. We are also enclosing a list of your comments with our replies. It is our intent to provide all the information necessary for an adequate evaluation of the project.

Please review the proposed changes, additions, and answers to comments; and advise us if this is sufficient for an improved rating. We will be happy to visit by phone, or meet with you, and do what we can to achieve mutual understanding necessary for project evaluation.

Sincerely,

Robert K. Griffin **Acting**
State Conservationist

Enclosure

cc:
Marion E. Strong, SCS, Lincoln, Nebraska
James W. Mitchell, SCS, Washington, D. C.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
1735 BALTIMORE
KANSAS CITY, MISSOURI 64108

September 23, 1977

Mr. Robert K. Griffin
State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
P.O. Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

Thank you for providing our office with a copy of your proposed responses to our Agency's comments on the Draft Environmental Impact Statement for the Middle Creek Watershed project. Allowing our staff to review and comment on your proposed responses will hopefully enable our agencies to resolve any outstanding differences with the project prior to the public release of the final environmental statement.

Much of our concern with this watershed project has been the issue of providing a domestic water supply to an area already short of suitable water and the effect(s) of this water in promoting further development in the service area which, in turn, could create an additional demand for water. We have discussed this concern with members of both your staff and representatives of the Kansas Water Resources Board. These discussions, plus the additional information included as a part of your proposed responses, have clarified several aspects of the project including available water supplies, water districts affected, population projections, and water supply-water demand forecasts. Consequently, if the information provided to us is included in the final environmental statement, our inadequate rating of the draft statement is resolved.

The following comments address our remaining concerns with the project and suggest measures to be taken by your agency prior to issuance of the final environmental statement.

We disagree with your contention that more intense development would continue and even accelerate in the upper end of the Middle Creek Watershed whether or not the project is constructed. Regardless of the proximity of the watershed to the Kansas City metropolitan area or the improved highway system serving eastern Miami County, we doubt people would knowingly

move into an area which has a known or predicted water supply shortage. We acknowledge there has been a movement of people into northeastern Miami County, but we contend this influx occurred in anticipation of the several rural water districts distributing available water supplies to the area.

The conditions which encouraged the exurban development in northern Miami County do not apply to the area to be served by the Middle Creek Watershed. If your calculations of water supplies and population projections are accurate, the Middle Creek Watershed, both alone or in combination with the Hillsdale Reservoir, would not be able to supply enough water to meet the demand created by the projected 300 percent population increase by the year 2020. This is a problem caused by the lack of an available water supply and not by an inadequate distribution system.

We suggest the appropriate state and local agencies responsible for the planning and zoning of Miami and Linn Counties be made aware of the potential population increase creating a demand which would exceed the available water supply. The actions that can or would be taken by these agencies to limit development commensurate with available water supplies should be included in the final statement. Unless limits are placed on future development in the Middle Creek service area, available water supplies may again become inadequate to meet the demand and may result in a repeat of the hardships currently being endured by the County residents.

Our agencies agree that inappropriate development above the multipurpose impoundment could have an adverse impact on the water quality of the reservoir. Your response implied strict planning and zoning regulations, if enforced, would be able to maintain the water quality of the reservoir at an acceptable level. We concur with your conclusion. We suggest that, prior to issuance of the final statement, your agency contact the responsible planning and zoning authorities for Miami County to obtain a commitment that development in the watershed above the multipurpose impoundment would be compatible to maintain the water quality of the reservoir. Unless there is a commitment to monitor and control development in this area, we believe no project benefits should be taken for water supply.

We recognize our suggestions for controls on both future development in the watershed and incompatible development above the multipurpose impoundment are beyond the control of your agency. However, we believe the concerns we have raised are important to ensuring the environmental suitability of the proposed action and should be addressed in the final statement. This is particularly true for the Middle Creek Watershed

project because of the development pressures created by its proximity to the Kansas City metropolitan area and the projected population increases. Only when the primary and secondary effects are described, and the measures to be taken to reduce any adverse impacts are provided, can the short- and long-term impacts of the proposed action be understood.

We appreciate the opportunity to review and comment on your proposed responses. If you have any questions regarding our letter, please do not hesitate to contact our office.

Sincerely yours,

Kathleen Q. Camin, Ph.D.
Regional Administrator

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Box 600, Salina, Kansas 67401

October 13, 1977

Ms. Kathleen Q. Camin
Regional Administrator
Environmental Protection Agency
1735 Baltimore
Kansas City, Missouri 64108

Dear Ms. Camin:

Your reply of September 23, 1977, regarding the Draft Plan and Environmental Impact Statement for Middle Creek Watershed was most welcome. We are happy to have the question of the adequacy of the document resolved. The material furnished to you is being included in the final plan/environmental impact statement as you asked.

We also appreciate your comments and suggestions regarding the project itself. You suggested that the appropriate state and local agencies responsible for the planning and zoning of Miami and Linn Counties be made aware of the potential population increase creating a demand which would exceed the available water supply. You also suggested that we contact the responsible planning and zoning authorities for Miami County to obtain a commitment that development in the watershed above the multipurpose impoundment would be compatible to maintain the water quality of the reservoir.

We agree that the responsible planning and zoning authorities should be aware of these concerns. Hence, we are including your letter of September 23 in the final plan/environmental impact statement. We are also forwarding your letter to the Miami and Linn County Boards of Commissioners, the Linn County Planning Board, and the Middle Creek and Miami Township Zoning Boards for that purpose. We will encourage them and assist in any way that we can.

Sincerely,

Robert K. Griffin
State Conservationist

STATE OF KANSAS

OFFICE OF THE GOVERNOR
State Capitol
Topeka

ROBERT F. BENNETT
Governor

July 20, 1977

Mr. Robert K. Griffin
State Soil Conservationist
Soil Conservation Service
P. O. Box 600
Salina, Kansas 67401

Dear Mr. Griffin:

This is in reply to your letter of April 15th transmitting the Middle Creek Watershed Work Plan and Environmental Impact Statement for official state review. Copies of the Work Plan report were distributed to state agencies for their review through the Water Resources Board. Replies received from the concerned agencies indicate the plan satisfactorily addresses points of concern which were expressed in earlier reviews. The Water Resources Board advises that at their May, 1977, meeting a resolution reaffirming the state's interest in the multipurpose structure of the Watershed Work Plan of Middle Creek Watershed Joint District No. 50 was adopted. The City of Louisburg and Miami County Rural Water District No. 2 are negotiating a loan with Farmers Home Administration to finance the nonfederal costs commitment in this structure and I am advised the Water Resources Board will withdraw as sponsor of that element of the total watershed work plan. The Water Resources Board also advises that the proposed developments included in the Work Plan are consistent and in accord with the State Water Plan.

I concur in the views expressed by the Water Resources Board and recommend that the Work Plan be transmitted to Congress for their early consideration and appropriate action.

Very sincerely,

Robert F. Bennett
Governor of Kansas

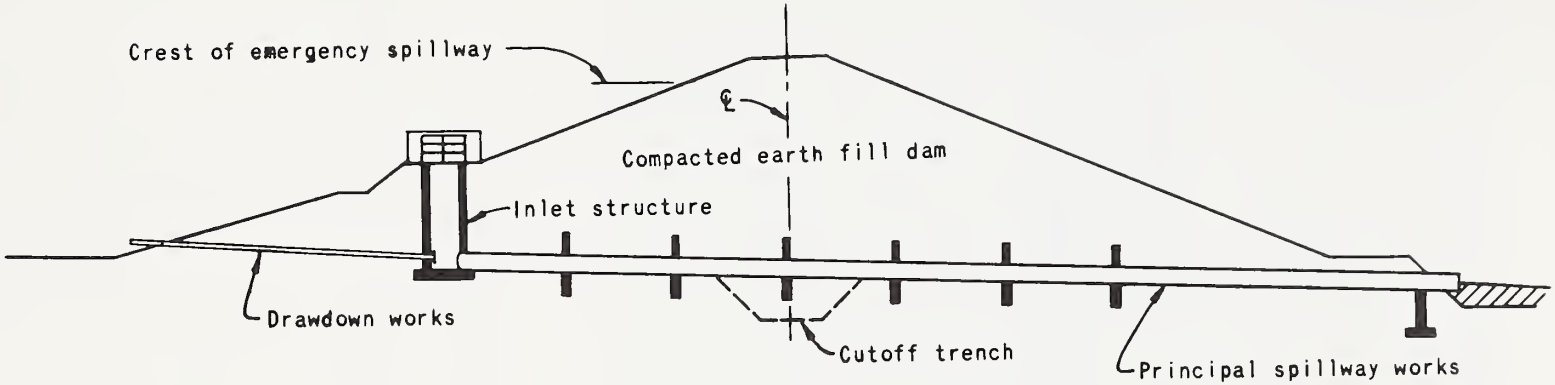
RFB:pc

A P P E N D I X D

Earth Dam With Drop Inlet Spillway

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TYPICAL EARTH DAM WITH DROP INLET SPILLWAY



CROSS SECTION OF DAM ON CENTERLINE OF PRINCIPAL SPILLWAY

NOTES:

1. FOR INDIVIDUAL STRUCTURE DATA SEE TABLE 3.
2. EMBANKMENT AND FOUNDATION DESIGN FEATURES NOT SHOWN.

A P P E N D I X E

Illustrations of Watershed Problems

FIGURE E-1 CHANNEL SEDIMENTATION

Sediment and vegetation reduce channel capacity along much of Middle Creek.

FIGURE E-2 CHANNEL EROSION AND DEPOSITION

Both streambank erosion and channel deposition are shown in this photograph. The capacity of the channel has been reduced by 50 percent. Note the lack of stream edge forest due to agriculture use.

FIGURE E-3 FLOOD PLAIN DEPOSITION

This photograph shows the impact of flood plain deposition in Middle Creek Watershed. Mr. Harold Mooney Sr. is holding the top wire of a 26-inch hog wire fence buried by deposition. Indeed the photo shows three fences, each built above the other. In the background Middle Creek is visible flowing through a channel reduced in capacity by as much as 50 percent through sediment deposition.

ROAD DAMAGE ALMOST $1 PER ACRE—Clyde Hamilton inspects damages inflicted to the county road adjacent to his farm, 4 miles south of New Lancaster. That damage is high is shown in the report of R. H. Eckhoff, Miami county engineer, who estimated that flood damage to the 1091 miles of county roads amounts to $310,000. Miami county, with an area of 378,240 acres of which 361,026 acres are agricultural land, is serviced by 88 miles of surfaced state and federal roads, 29 miles surfaced, 922 miles graveled and 140 miles graded dirt county roads. Flood control on the streams would greatly reduce road damages caused by these deluging storms. (Courtesy Soil Conservation Service)

The Western Spirit 9-25-61

NOT FIGURED IN THE LOSS—Harold Mooney, Sr., is shown repairing his fences following the September 13 flood. Such repairs must be made immediately to keep livestock in lots and pastures. Mooney, who has led the steering committee in the move to get the watershed on Middle Creek, estimates it will cost him between $1,000 and $1,200 in materials and labor to fix the fences washed out by the flood. He was born and reared on this Middle Creek valley farm and reports the water was five inches higher than in any previous flood he can recall—in slightly over fifty years. Such fence damage is not estimated in the loss of crops, roads and other property hit by the flood. (Soil Conservation Service Photo)

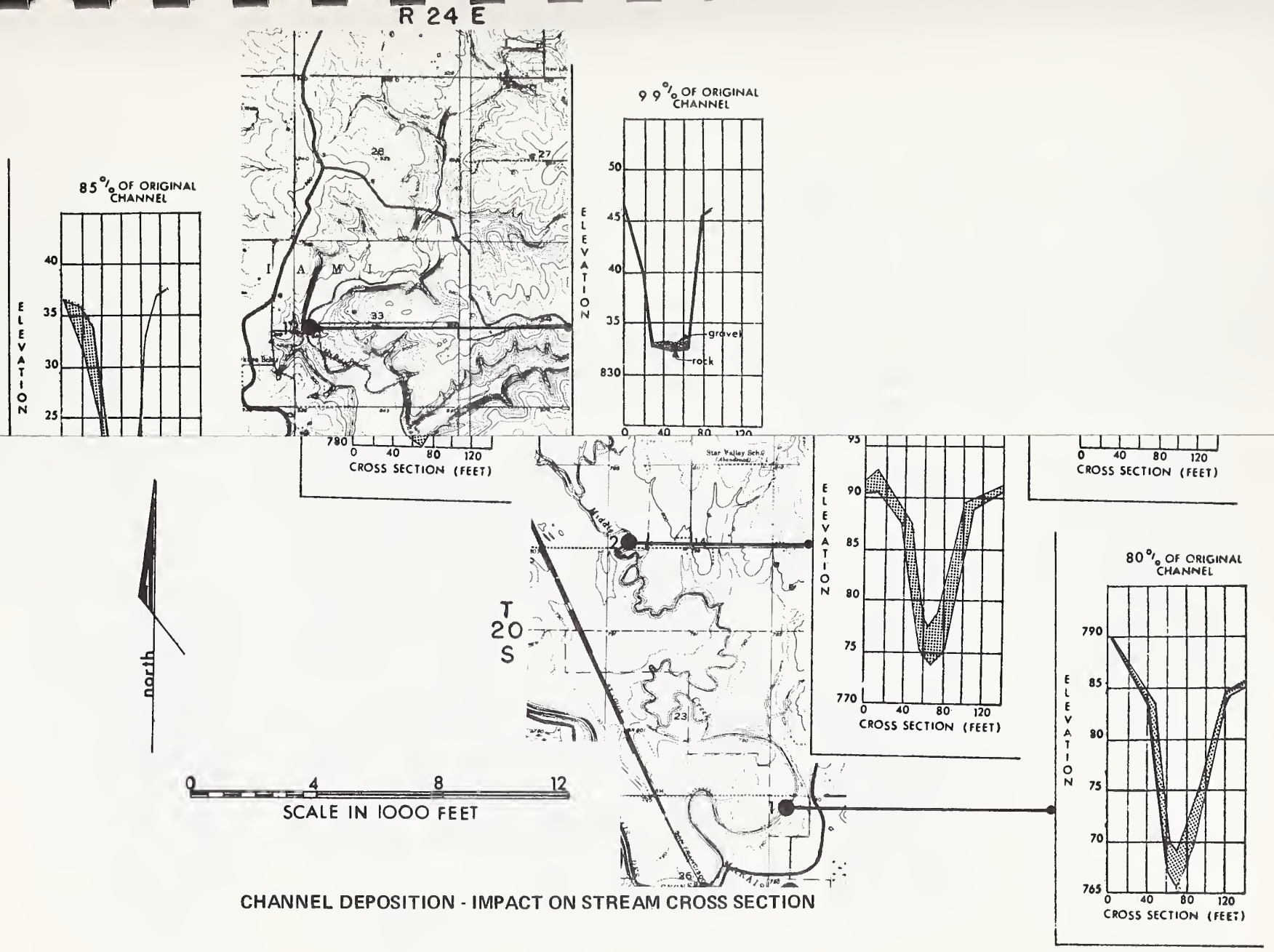
The Miami Republican 9-28-61

FIGURE E-4 FLOOD DAMAGE

FIGURE E-5

LOG JAMS

A constant problem on Middle Creek is the creation of log jams. These photographs show the results of such activity. The lower photographs are two views of the same site.



CHANNEL DEPOSITION - IMPACT ON STREAM CROSS SECTION

*U. S. GOVERNMENT PRINTING OFFICE:1976-669-513

CHANNEL DEPOSITION - IMPACT ON STREAM CROSS SECTION

*U. S. GOVERNMENT PRINTING OFFICE:1976-669-513

A P P E N D I X F

Definitions of Conservation Treatment Practices

CONSERVATION PRACTICES FOR RESOURCE MANAGEMENT SYSTEMS

Conservation Cropping System: Using needed cultural and management measures for crops. Cropping systems include rotations that include grasses and legumes as well as rotations in which the desired benefits are achieved without these crops.

Stubble Mulching: Managing plant residue on a year-round basis in which harvesting, tilling, planting, and cultivating are performed to keep protective amounts of vegetation on the soil surface.

Minimum Tillage: Limitation of cultivation to that essential to crop production and prevention of soil loss.

Gradient Terraces: A system of earth embankments, ridges and channels constructed along a slope at a suitable spacing and with an acceptable grade.

Diversion: A channel with a supporting ridge on the lower side constructed across a slope to protect land lower on the slope from excessive runoff from land above the diversion.

Contour Farming: Cultivation of sloping land at right angles to the slope. This includes following established grades of terraces, diversions, or contour strips.

Grassed Waterway or Outlet: A natural or constructed passageway for water with vegetation established suitable for safe disposal of runoff from a field, diversion, terrace, or other structure.

Drainage: Disposal of excess water in a field by grading to reshape the land surface or by construction of a graded ditch.

Proper Grazing Use: Grazing at an intensity which will maintain enough cover to protect the soil and maintain or improve the quality and quantity of desirable vegetation. This includes stocking at rates compatible with forage production and rotating grazing use between two or more pastures.

Planned Grazing Systems: A system in which two or more grazing units are alternately rested from grazing in a planned sequence over a period of years. The rest period may be throughout the year or during part of the growing season of the desirable plants.

Brush Management: Manipulation of stands of brush by mechanical, chemical, or biological means, or by controlled burning. This includes reducing excess brush and weeds to restore natural plant community balance and manipulation of brush stands through selective and patterned control methods.

Range Seeding: Establishing adapted plants by seeding on rangeland.

Pond: A water source for livestock or other use made by constructing a dam or embankment, or by excavating a pit.

Detention Dam: A dam or embankment which temporarily detains floodwater to regulate the rate of flow in a watercourse.

Woodland Improvement: This may include harvesting mature trees, removing poor quality or less desirable trees, and pruning the managed species.

Windbreak and Shelterbelt Planting and Renovation: Planting tree and shrub seedlings to establish new, or renovate existing shelterbelts and windbreaks. Renovation may also include the removal or pruning of existing plants or the adoption of improved management practices.

Hedgerow Replacement or Renovation: Hedge seedlings planted to establish permanent field borders and add to wildlife habitat and landscape beautification.

Grazing Control: Grazing to prevent damage to young native trees, new plantings, and cultural operations.

Tree and Shrub Plantings: Special plantings at each floodwater retarding structure for wildlife habitat, recreation shelter, and site beautification. Plantings in other areas will serve similar purposes.

Fire Control: The prevention of wildfires in forest land, application of approved fire protection and prevention methods, effective control of going fires, and development of fire prevention educational programs.

A P P E N D I X G

Surface Water Quality Assessment

SURFACE WATER QUALITY ASSESSMENT

Three sets of water samples were taken from each of six points on Middle Creek and analyzed for quality. Sampling stations are shown on a watershed map (Figure G-1). Samples were collected by Van Doren-Hazard-Stallings, Consulting Engineers, and analyzed by the Kansas State Department of Health and Environment.

The first collection was on December 6, 1974. Precipitation amounts prior to sampling were normal. A light drizzle fell during sample collection. Air temperature was 45°F. Water temperature varied from 38 to 40°F. Saturated dissolved oxygen concentration at this temperature is 13.0 milligrams per liter (mg/l). None of the samples were saturated with oxygen. However, dissolved oxygen contents were significantly above established standards for surface water. All other tested parameters (except fecal coliform) also indicated good water quality.

The second water sample was collected on January 24, 1975. Precipitation between the sampling dates was frequent but no significant runoff occurred. Several fields partially plowed at the first sampling were not finished by the second sampling, presumably because of wet ground. Flow rates in Middle Creek were noticeably higher at the second sampling, probably due to increased ground water. No precipitation fell for several days before this sampling. Air temperature was 43°F and skies were cloudy at the time of sampling. Table G-1 shows test results for normal flow samples.

On June 17, 1975, floodwater samples were collected. Middle Creek was approximately bank full at the lower end of the watershed with some lowland flooding. At the upper end of the watershed the stream was well within its channel although noticeably higher than during previous sample collections. Precipitation prior to this collection varied from 1 inch at the upper end of the watershed to over 4 inches south of the Linn-Miami County line. Peak rainfall rate was 3 inches in one hour. Table G-2 shows floodwater test results.

Table G-3 shows a comparison of selected water quality parameters between Middle Creek and the Marais des Cygnes River at Trading Post. All measured concentrations are within the limits of current surface water criteria. Table G-3 indicates unmeasured cations and anions (Ca^{++}, Mg^{++},

Na^+, K^+, $SO_4^=$, Cl^-, and F^-) would be comparable to recorded concentrations of these ions in Marais des Cygnes River water.

Table G-4 shows Kansas' specific water quality criteria for Class A and B waters. Samples tested during the assessment meet these criteria with the exception of fecal coliform content. Five samples in 30 days are required to establish the actual fecal count for Class A waters. Kansas' specific criteria allow violations of fecal coliform content from natural non-point sources during periods of surface runoff.

Table G-5 shows the results of bioaccumulation analyses for pesticide residues made on fish collected in August 1976, and lists comparative data from criteria established in Food and Drug Administration Guideline 7420.09 and Volume I of the U.S. Environmental Protection Agency Proposed Criteria for Water Quality. All measured concentrations are within the limits of these current surface water criteria.

TABLE G-1 - WATER QUALITY SAMPLE RESULTS
(Normal Flow)

PARAMETER (Units) [1]	SAMPLE SITE											
	One		Two		Three		Four		Five		Six	
	12-6-74	1-14-75	12-6-74	1-24-75	12-6-74	1-24-75	12-6-74	1-24-75	12-6-74	1-24-75	12-6-74	1-24-75
PHYSICAL												
Temperature (^{o} F.)	39	35	40	35	39	36	38	36	39	36	38	34
Streamflow[2] (cfs)	8	26	8	24	7	24	5	24	4	25	1	2
Velocity[2] (fps)	0.1	0.4	1.3	1.2	1.3	1.8	1.6	2.0	1.2	1.7	1.0	1.3
Dissolved Oxygen	11.5	12.4	11.4	12.2	11.8	12.2	11.5	12.2	11.4	12.6	11.8	13.0
% saturation	87.8	89.2	87.7	87.8	90.1	89.1	85.8	89.1	87.0	92.0	88.1	91.5
pH (pH units)	7.7	8.0	7.7	7.9	7.7	7.9	7.7	7.9	7.9	8.0	7.7	7.9
Turbidity (JTU)	45	35	8	7	8	3	7	7	2	8	3	3
5-Day 20^{o} C BOD	5.2	0.9	3.5	1.6	3.4	1.3	0.5	2.1	1.0	0.6	2.4	0.6
CHEMICAL												
Calcium as Ca	--	--	--	--	--	--	--	--	--	--	75	68
Magnesium as Mg	--	--	--	--	--	--	--	--	--	--	12	9.4
Alkalinity												
HCO_3 as Ca CO_3	242	228	236	230	232	228	234	232	188	192	182	172
CO_3 as $CaCO_3$	0	0	0	0	0	0	0	0	0	0	0	0
OH as $CaCO_3$	0	0	0	0	0	0	0	0	0	0	0	0
Sulfate	--	--	--	--	--	--	--	--	--	--	43	32
Chloride	--	--	--	--	--	--	--	--	--	--	9	8
Nitrate as NO_3	0.6	2.6	0.7	3.2	0.6	2.3	0.7	2.6	0.6	3.8	0.6	4.0
Total Phosphate as PO_4	0.18	0.32	0.13	0.21	0.13	0.16	0.15	0.17	0.11	0.23	0.15	0.20
Total Dissolved Solids	334	320	320	322	310	323	326	320	260	280	280	265
Susp. Solids - Fixed	23	21	19	9	31	12	14	10	10	18	4	24
Susp. Solids - Volatile	41	40	30	17	49	12	10	16	23	14	17	24
Total Hardness as $CaCO_3$	--	--	--	--	--	--	--	--	--	--	236	208
BACTERIOLOGICAL												
Fecal Coliform[3]	90	30	110	200	75	20	45	200	40	1300	230	50
Total Coliform[3]	--	--	--	--	--	--	--	--	--	--	800	160

(1) Unless otherwise specified, units are mg/l.
(2) Streamflow and velocity were not measured at exact water sample site
(3) Organisms per 100 ml.

Source: Analyses conducted by Kansas Department of Health and Environment, Environmental Laboratory.

TABLE G-2 - FLOOD FLOW WATER QUALITY
(Sample Date: June 17, 1975)

PARAMETER (Units)[1]	SAMPLE SITE					
	ONE	TWO	THREE	FOUR	FIVE	SIX
PHYSICAL						
Temperature (^{o}F.)	68	68	69	68	67	69
Streamflow[2] (cfs)	910	635	1,080	475	145	25
Velocity[2] (fps)	2.3	1.6	2.9	1.2	5.5	1.2
Dissolved Oxygen	6.0	6.6	7.0	6.8	7.5	7.6
% Saturation	65.2	71.7	76.9	73.9	80.6	83.5
pH (pH Units)	7.6	7.6	7.6	7.5	7.6	7.5
Turbidity (JTU)	650	1,000	1,200	1,100	650	250
5-Day 20^{o}C. BOD	5.0	5.1	4.6	6.3	6.8	3.8
CHEMICAL						
Calcium as Ca	--	--	--	--	--	30
Magnesium as Mg	--	--	--	--	--	2.2
Alkalinity						
HCO_3 as $CaCO_3$	78	78	80	84	80	78
CO_3 as $CaCO_3$	--	--	--	--	--	--
OH as $CaCO_3$	--	--	--	--	--	--
Sulfate	--	--	--	--	--	15
Chloride	--	--	--	--	--	7.0
Nitrate as NO_3	4.6	11.0	10.0	9.1	10.0	5.5
Total Phosphate as PO_4	0.70	0.60	0.52	0.56	0.38	0.31
Total Dissolved Solids	136	128	280	272	280	264
Susp. Solids - Fixed	592	640	624	560	340	110
Susp. Solids - Volatile	124	140	128	104	72	40
Total Hardness as $CaCo_3$	--	--	--	--	--	84
BACTERIOLOGICAL						
Fecal Coliform[3]	16,000	27,000	22,000	33,000	26,000	9,000
Total Coliform[3]	--	--	--	--	--	71,000

(1) Unless otherwise specified, units are mg/l.
(2) Streamflow and velocity were not measured at exact water sample site.
(3) Organisms per 100 ml.

Source: Analyses conducted by Kansas Department of Health and Environment, Environmental Laboratory.

TABLE G-3 WATER QUALITY COMPARISON

Date	Location and Significance	Discharge (cfs)	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$HCO\bar{3}$	$CO\bar{3}$	$SO\bar{4}$	Cl^{-}	F^{-}	$NO\bar{3}$	$PO\bar{\bar{4}}$	Dissolved Solids Residue		Ratio Dissolved Solids To Specific Conductance	Specific Conductance	pH
														Calc.	Meas.			
	Middle Creek																	
12-6-74	Sample Site 1 Normal Flow	8	-	-	-	-	242	0	-	-	-	0.60	0.18	-	334	-	-	7.7
1-24-75	Sample Site 1 Normal Flow	26	-	-	-	-	228	0	-	-	-	2.60	0.32	-	320	-	-	8.0
6-17-75	Sample Site 1 Flood Flow	910	-	-	-	-	78	0	-	-	-	4.60	0.70	-	136	-	-	7.6
12-6-74	Sample Site 2 Normal Flow	8	-	-	-	-	236	0	-	-	-	0.80	0.13	-	320	-	-	7.7
1-24-75	Sample Site 2 Normal Flow	24	-	-	-	-	230	0	-	-	-	3.20	0.21	-	322	-	-	7.9
6-17-75	Sample Site 2 Flood Flow	635	-	-	-	-	78	0	-	-	-	11.00	0.60	-	128	-	-	7.6
12-6-74	Sample Site 3 Normal Flow	7	-	-	-	-	232	0	-	-	-	0.60	0.13	-	310	-	-	7.7
1-24-75	Sample Site 3 Normal Flow	24	-	-	-	-	228	0	-	-	-	2.30	0.16	-	323	-	-	7.9
6-17-75	Sample Site 3 Flood Flow	1080	-	-	-	-	80	0	-	-	-	10.00	0.52	-	280	-	-	7.6
12-6-74	Sample Site 4 Normal Flow	5	-	-	-	-	234	0	-	-	-	0.70	0.15	-	326	-	-	7.7
1-24-75	Sample Site 4 Normal Flow	24	-	-	-	-	232	0	-	-	-	2.60	0.17	-	320	-	-	7.9
6-17-75	Sample Site 4 Flood Flow	475	-	-	-	-	84	0	-	-	-	9.10	0.56	-	272	-	-	7.5
12-6-74	Sample Site 5 Normal Flow	4	-	-	-	-	188	0	-	-	-	0.60	0.11	-	260	-	-	7.9
1-24-75	Sample Site 5 Normal Flow	25	-	-	-	-	192	0	-	-	-	3.80	0.23	-	280	-	-	8.0
6-17-75	Sample Site 5 Flood Flow	145	-	-	-	-	80	0	-	-	-	10.00	0.38	-	280	-	-	7.6
12-6-74	Sample Site 6 Normal Flow	1	75	12	-	-	182	0	43	9.0	-	0.60	0.15	-	280	-	-	7.7
1-24-75	Sample Site 6 Normal Flow	2	69	9.4	-	-	172	0	32	8.0	-	4.00	0.20	-	265	-	-	7.9
6-17-75	Sample Site 6 Flood Flow	25	30	2.2	-	-	78	0	15	7.0	-	5.50	0.31	-	264	-	-	7.5
	Marias des Cygnes Near Kansas-Missouri State Line 1969-1972																	
9-24-69	Selected TDS Concentration	700	+193		-	-	221	0	27	17	-	3.6	-	-	262	0.71	371	8.7
10-22-69	Selected TDS Concentration	9510	+144		-	-	151	0	23	6.6	-	4.8	**0.52	-	275	0.81	339	7.1
11-13-69	Selected TDS Concentration	1110	+276		-	-	296	0	41	11	-	3.1	**0.33	-	338	0.62	548	8.2
2-18-70	Selected TDS Concentration	238	+251		-	-	260	0	50	16	-	3.1	**0.27	-	329	0.61	543	8.2
3-18-70	Selected TDS Concentration	187	+284		-	-	293	0	55	18	-	0.1	**0.17	-	304	0.55	557	8.1
4-16-70	Selected TDS Concentration	1010	+259		-	-	269	0	50	13	-	6.3	**0.22	-	338	0.64	530	8.2
7-14-70	Selected TDS Concentration	138	+251		-	-	275	0	39	12	-	2.8	**0.18	-	314	0.61	514	8.1
1-21-71	Selected TDS Concentration	1070	80	10	16	-	-	-	53	12	1.3	1.5	**0.11	-	329	0.61	536	-
4- 6-71	Selected TDS Concentration	326	86	12	19	-	267	0	54	15	0.1	0	**0.11	317	278	0.53	538	8.2
1-20-72	Selected TDS Concentration	575	91	10	15	-	269	0	50	13	0.2	*1.2	-	312	346	0.63	549	7.9
4-27-72	Selected TDS Concentration	1000	69	9.1	14	-	209	0	62	12	0.3	*1.2	**0.37	270	330	0.72	459	7.6
9- 9-72	Selected TDS Concentration	1280	57	8.9	16	3.9	-	-	32	15	0.4	*0.29	-	-	272	0.63	434	7.4
12-17-71	Highest Discharge (cfs)	16,300	28	6.3	6.0	5.0	88	0	17	9.0	0.5	-	**0.20	115	154	0.73	210	7.1
10-20-71	Lowest Discharge (cfs)	74	43	6.8	18	-	156	0	41	18	0.2	*0.53	**0.42	204	220	0.59	371	6.9
1-14-70	Highest TDS Concentration	208	+331		-	-	353	0	63	13	-	2.1	**0.20	-	413	0.63	659	8.1
7-26-71	Lowest TDS Concentration	5860	21	3.0	4.9	-	70	0	14	4.5	0.3	-	**0.45	82	118	0.79	150	7.6
1969-1972	Av. Selected Concentration & Discharge	1429	77	10	16	-	251	0	45	13	0.5	2.7	**0.25	287	310	0.63	492	8.0
1969-1972 (24 Samples)	Av. Concentration & Discharge	3948	53	7	12	4.2	220	0	37	12	0.4	3.6	-	237	264	0.64	414	7.8
	Middle Creek																	
12-6-74 & 1-24-75	Av. Sample Site Concentrations & Discharge	13	72	11	-	-	216	0	38	8	-	1.9	0.18	237	305	-	-	7.8

* Nitrite plus Nitrite
** Total Phosphorous
\+ CA & Mg as Hardness

TABLE G-4 - KANSAS SPECIFIC WATER QUALITY CRITERIA
FOR CLASS A AND B WATERS

Parameter	Class	Criteria[1]
Bacteria	A	200/100 ml (geometric mean) not more than 10% of samples exceeding 400/100 ml
	B	2000/100 ml
Dissolved Oxygen	A	5 mg/l
	B	5 mg/l (4 mg/l for short periods within 24 hours)
Temperature		90° F maximum
Stream		5° F above natural
Lake		3° F above natural
pH		6.5 to 8.5
Ammonia		0.15 mg/l as N

NOTE: All other specific criteria essentially refer to non-degradation of existing conditions that would be harmful to established beneficial use.

(1) Unless specified criteria is same for Class A and B waters. Class A water is suitable for direct body contact such as swimming, water skiing and skin diving. Class B water is suitable for secondary recreation contact such as fishing, wading and boating. Class A and B water is suitable for preservation and propagation of desirable fish and wildlife, public water supply, industrial water supply and agriculture purposes.

Source: Kansas Water Quality Criteria authorized by K.S.A. 65-165.

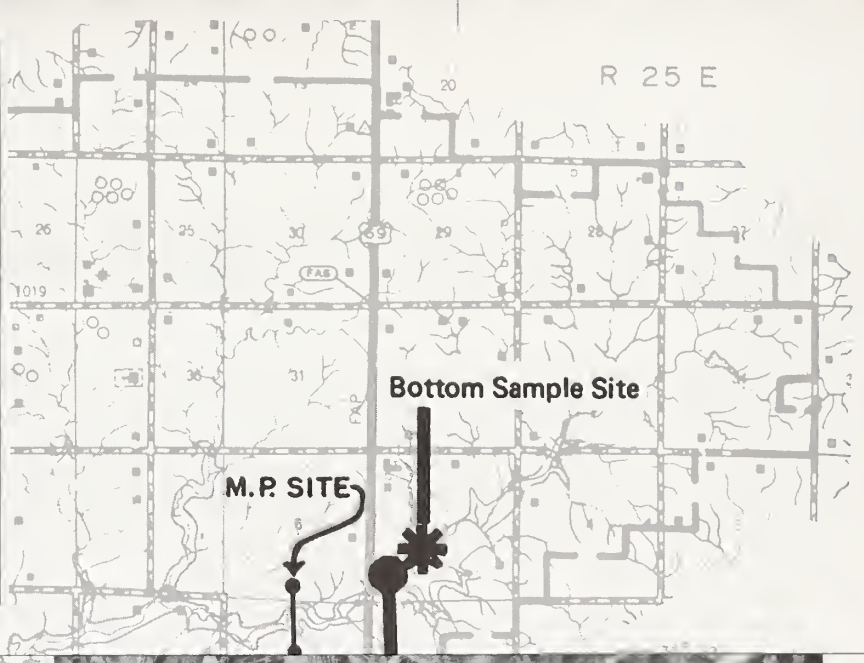
TABLE G-5 - FISH TISSUE PESTICIDE RESIDUE RESULTS

(August 1976)

Sample Location	Fish Species	Pesticide Concentrations - In Micrograms/Kg.					
		L (1)	E (1)	A (1)	D (1)	H (1)	DDT
SE1/4-29-T17S-R25E	BG	1.3	ND (2)	0.9	1.3	1.7	5.0
SE1/4-29-T17S-R25E	BG	0.4	ND	ND	1.1	1.3	2.3
SE1/4-29-T17S-R25E	LMB	0.2	ND	ND	1.1	0.3	3.0
32-T17S-R25E	BG	0.7	ND	0.4	1.3	0.7	4.2
32-T17S-R25E	CC	0.9	ND	ND	18.1	1.6	44.3
Food and Drug Maximum Criteria In Micrograms/Kg.		NA (3)	300	300	300	300	NA
EPA Proposed Maximum Criteria In Micrograms/Kg.		50,000	(4)	(4)	(4)	(4)	50,000

(1) L-Lindane, E-Endrin, A-Aldrin, D-Dieldrin, H-Heptachlor.
(2) ND - None detected.
(3) NA - None established.
(4) The sum of the concentrations of these pesticides is not to exceed 5,000 micrograms/ kg.

Site 5 - Mossy rock in stream bed, minnows observed



Site 1 - Clay bottom, turbid water

Site 2 - Clay bottom

FIGURE G-1
SAMPLE STATIONS

Site 5 - Mossy rock in stream bed, minnows observed

Site 6 - Rock in stream bed, reasonably clear

Site 3 - Clay bottom

Site 4 - Clay bottom

Site 1 - Clay bottom, turbid water

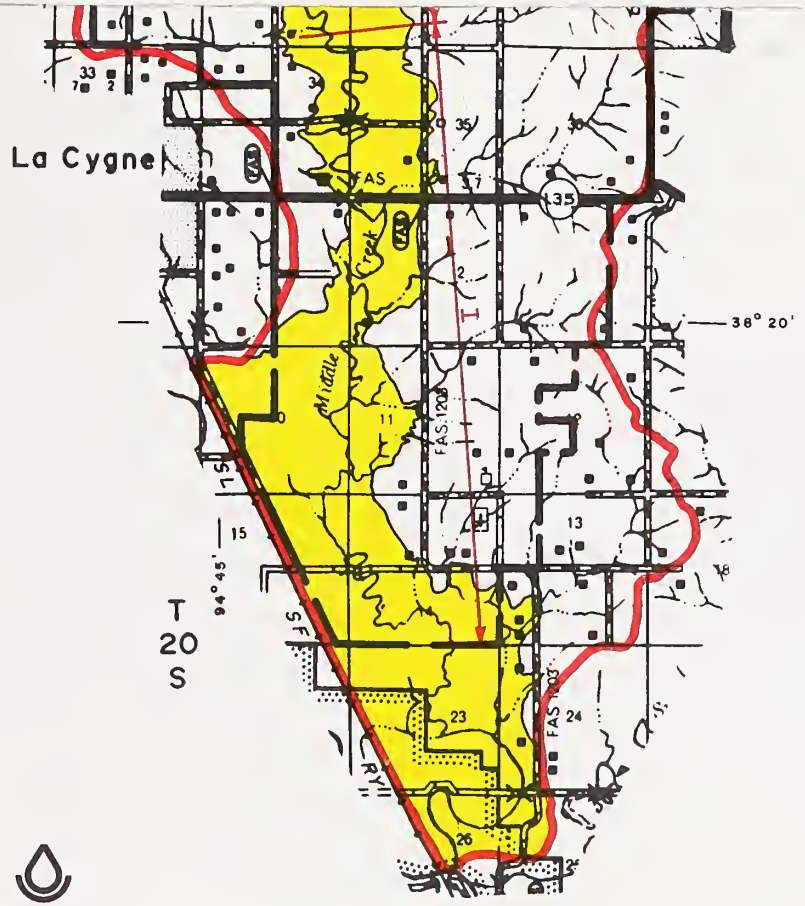
Site 2 - Clay bottom

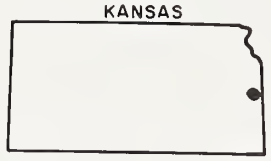
Bottom Sample Site

FIGURE G-1
SAMPLE STATIONS

A P P E N D I X H

Maps of Project and Recreational Development





PROJECT MAP
MIDDLE CREEK WATERSHED
LINN & MIAMI COUNTIES
KANSAS

SOURCE:
COUNTY HIGHWAY MAPS AND INFORMATION
FROM FIELD TECHNICIANS.
POLYCONIC PROJECTION

SCALE 1/82,420

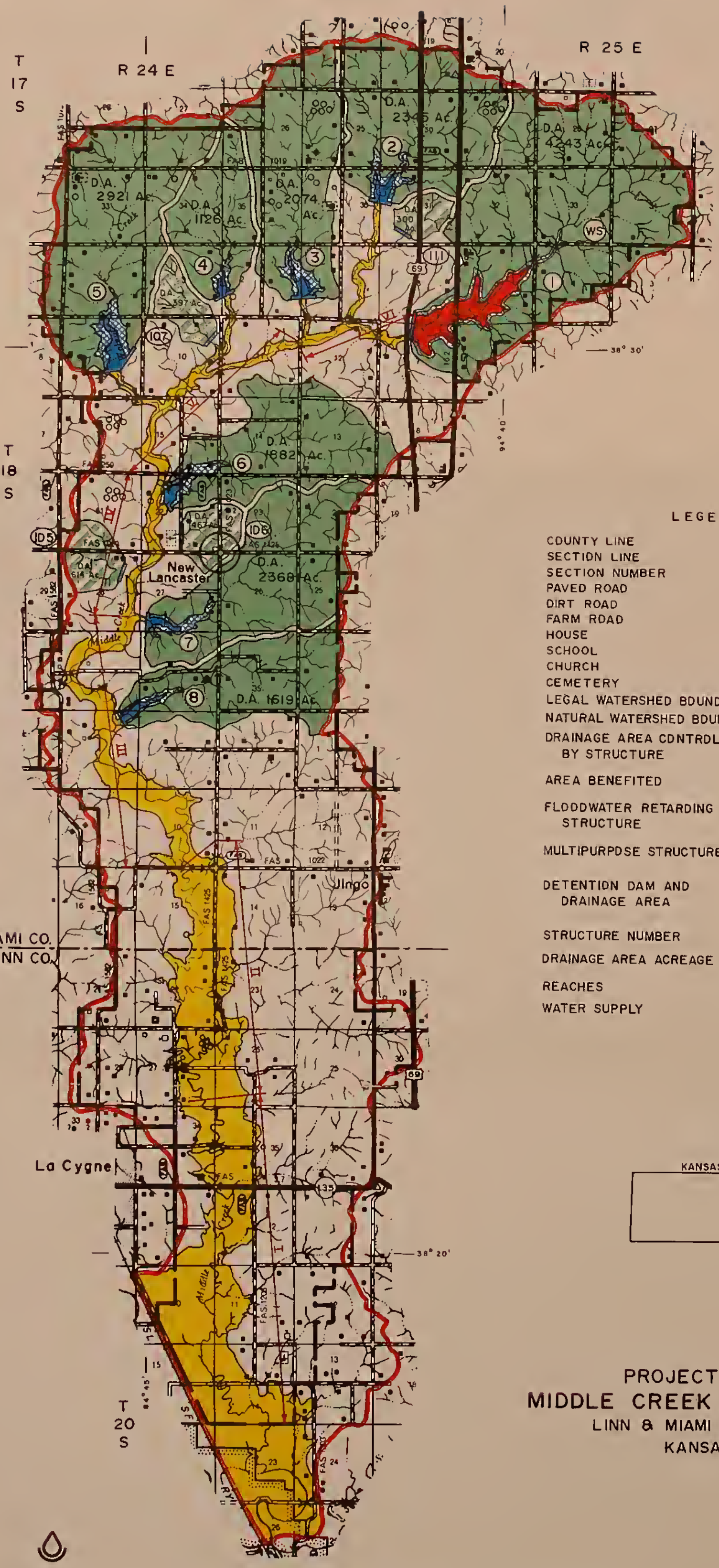
SCALE 1 0 1 2 3 MILES

REV. 1-1-76
5,P-26,229

USDA-SCS-LINCOLN, NEBR. 1976

U. S. DEPARTMENT OF AGRICULTURE

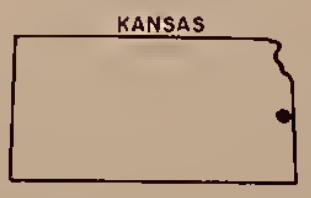
SOIL CONSERVATION SERVICE



N

LEGEND

COUNTY LINE	
SECTION LINE	
SECTION NUMBER	22
PAVED ROAD	
DIRT ROAD	
FARM ROAD	
HOUSE	
SCHOOL	
CHURCH	
CEMETERY	
LEGAL WATERSHED BOUNDARY	
NATURAL WATERSHED BOUNDARY	
DRAINAGE AREA CONTROLLED BY STRUCTURE	
AREA BENEFITED	
FLOODWATER RETARDING STRUCTURE	
MULTIPURPOSE STRUCTURE	
DETENTION DAM AND DRAINAGE AREA	
STRUCTURE NUMBER	(5)
DRAINAGE AREA ACREAGE	D.A. 1882 Ac.
REACHES	V
WATER SUPPLY	WS



PROJECT MAP
MIDDLE CREEK WATERSHED
LINN & MIAMI COUNTIES
KANSAS

SOURCE.
COUNTY HIGHWAY MAPS AND INFORMATION FROM FIELD TECHNICIANS.
POLYCONIC PROJECTION

SCALE 1/62,420

SCALE 1 0 1 2 3 MILES

REV. 1-1-76
5,P-26,229

USDA-SCS-LINCOLN, NEBR. 1976

RVICE

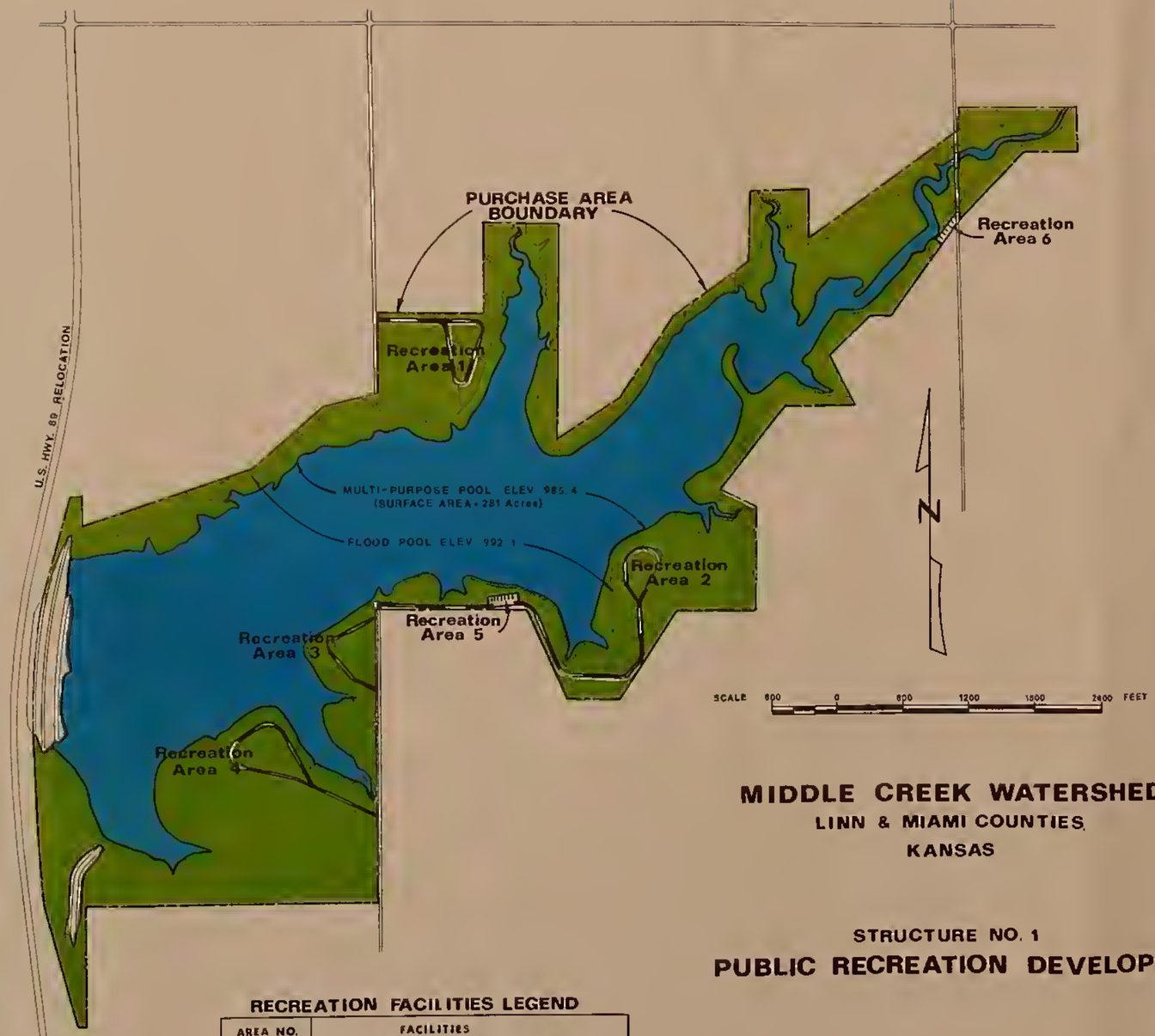
400 FEET

SHED

ELOPMENT

POPULATION CENTERS AND HIGHWAYS
WITHIN 50 MILE RADIUS

SCALE 10 5 0 10 20 30 40 50 MILES



MIDDLE CREEK WATERSHED

LINN & MIAMI COUNTIES,
KANSAS

STRUCTURE NO. 1

PUBLIC RECREATION DEVELOPMENT

RECREATION FACILITIES LEGEND

AREA NO.	FACILITIES
1 & 4	Vault Toilets, Water Well, Boat Ramp & Docks, Picnic Tables & Grills, Parking Areas
2 & 3	Vault Toilets, Water Well, Picnic Tables & Grills, Parking Areas.
5 & 6	Parking Area Only